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South with the Birds

A record of human migration to the sunny South

By EDMUND J. SAWYER

TO FOLLOW the swallow to a warmer clime was, not so many years ago, a flight of fancy and a day dream for most of us. Now with modern motor transportation, a human army accompanies or follows the birds in their annual migration, giving one-time dreams glorious fulfillment. I know, because I have joined the migration, indulging a desire of long standing.

Bird study and bird sketching on foot, from a canoe, from steamer-deck, from horseback, and from blinds, were frequent in my experience. Now I was to test the trailer as an approach to bird life. The trailer is, of course, incidental, and, so far as the birds are concerned, our actual viewpoint was usually the driver's seat of our car. And what we saw is, in great part, what can be seen and enjoyed by thousands of other interested motorists.

Our "migratory expedition", consisting of Mrs. Sawyer, our red cocker spaniel puppy, and myself, left Ithaca, New York, on the afternoon of November 1, 1937. Most of the summer birds had gone before us. A few juncos, a lone kingfisher, and one or two flocks of migrating robins were the only birds seen about our trailer in the suburbs as we loaded.

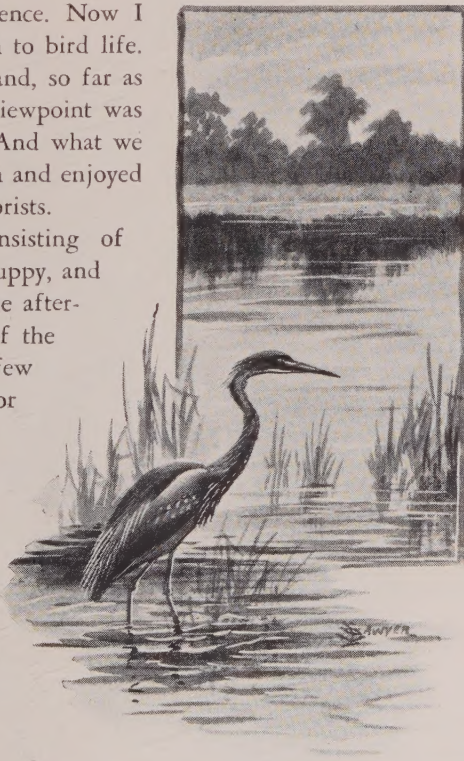
Our route was south across central Pennsylvania to Washington, D. C. This part of the trip was marked by increasing numbers of crows and starlings, our first meadowlark, a turkey vulture and a bluebird—the vulture and meadowlark at Gettysburg; the bluebird near Frederick, Maryland. In the large trailer camp in the Federal City were song sparrows, and starlings mingled on

familiar and equal terms with the equally abundant domestic pigeons and English sparrows. It was now the fourth of November. Few migrants had been overtaken, and, although we were to see many farther south, only a single migrant shrike had been recorded.

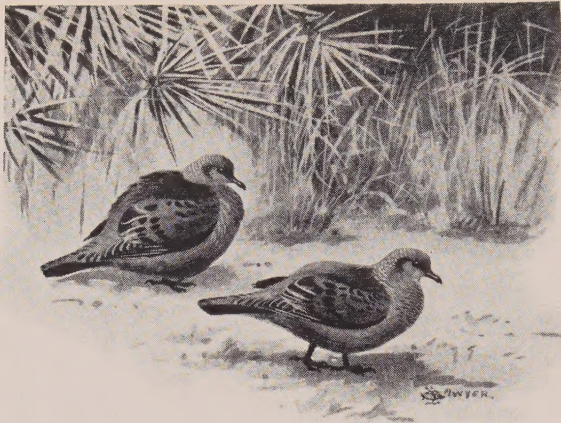
South of the Capital crows were much less common. Evidently we were near the limit of the usual southern range of crows that had migrated from the North. The

thrill of our first red-winged blackbirds—fellow migrants—fixes Alexandria, Virginia, in our minds. Our first sparrow hawk perched on a telegraph wire near Petersburg, in the same state. Some eight miles beyond Petersburg we parked for that night in the back yard of a decidedly rural filling station.

It was here that Chinquapin, our spaniel puppy, took a part in bird investigation. Owing to his independent efforts we met a large domestic goose. Watching Chinkey's methods closely, we learned, too, much about valor, including the judicious use of its better part—discretion. A goose was something new to Chinkey's experience. Amazed and frightened, at first, he circled about the bird. The slightest show of front by the goose, or the chance turning of its head, immediately widened the distance between them. Finally gathering his little all of courage, the pup made a



"A DARK, SLATY-BLUE BIRD STALKING SEDATELY IN THE MARSH PROVED OUR FIRST LOUISIANA HERON"



OCCASIONALLY A GROUND DOVE—SMALL, SHORT-TAILED, QUAIL-LIKE—FLUSHED FROM THE ROADSIDE

dubious, tentative mock jump or two and—lo, victory was in his paws. It went rapidly to his head! From the moment the goose made the grave mistake of taking one little step of retreat, it was forced to give ground, with steadily increasing loss of peace and dignity. Chinkey, in close and hot pursuit, enjoyed to the bursting point routing a potential enemy two or three times his size—until we caught and confined him to the trailer.

Waking the next morning, we heard familiar bird voices and knew we were among friends. Outside were song sparrows, bluebirds and meadowlarks—all singing. A red-eyed towhee, numerous blue-jays, and a hairy woodpecker were calling. There were also a few crows and a sparrow hawk. Best of all, a mockingbird was singing, while out of a thicket flashed a beautiful male cardinal. We no longer felt that we were merely following the birds. We were definitely caught up with them, and, to a large extent, they were henceforth our traveling companions.

A few miles farther south a tire needed repairing and, stopping at a service station, I took time to explore as usual. In the dooryard of an unoccupied cabin chipping sparrows were gleaning seeds or crumbs. Their heads of course had now lost the chestnut crowns of summer plumage. In the surrounding woods the crisp call of a junco and the lisping notes of a brown creeper sounded like home. A company of golden-crowned kinglets came close about with inquisitive manner that, in these birds, was quite new to me. It struck me that their wrenlike nosiness was due to the abundant food supply giving them leisure from search for insect eggs and larvae. Such search

is a nearly continuous quest during their migrations; so absorbing, indeed, that the birds may appear indifferent to humans.

Near Henderson, North Carolina, a migrant shrike was seen on a telegraph wire; soon another; then still another. This marked the beginning of an occurrence of pronounced regularity. From this point onward nothing was more typical of the day-to-day bird life than the lone and increasingly frequent shrikes on the roadside wires.

Robins, bluebirds, song sparrows, juncos and red-wing blackbirds continued numerous. To these and others was added, on November seven, our first definite Carolina wren, although we had already come far into its range.

For three days, from November eight, we camped in typical long-leaf pine forest in the sand hills belt near Aberdeen, North Carolina. Here there were many tracks of wild turkeys, and signs in the sandy wagon-roads of quarrelsome encounters between flocks of rival gobblers. Opossum tracks also were plentiful about our camp-site, while the nearby persimmon trees showed many stems denuded of their fruit by these night prowlers. The nightly hooting of a barred owl and the nocturnal barking of a gray fox added a fine wilderness touch appropriate to the setting of tall, stately pines and twinkling stars. Quail were more abundant—at least more in evidence—here than anywhere else from New York to Florida.

Continuing to Cheraw, South Carolina, on November twelve, we passed through a broad, well-defined lane of

broken tree trunks and general wreckage—the path of the previous night's cyclone. Impressed by the number of meadowlarks we had seen during the past two or three days, I made a systematic estimate of their number, including only individual birds seen, during a two hours' walk among cotton fields near Kingstree, South Carolina. I placed this number at one hundred. It is safe to say that I saw less than half the individual birds actually within the area covered. To the pleasing reassurance in this abundance of the meadowlark population was added the pleasure of their songs, for half of them seemed to be singing. Also abundant here, and equally given to singing, were song sparrows haunting the edges of the fields.

Mourning doves were now frequent; shrikes had increased in number; while a winter wren, a red-tailed hawk, a catbird and a brown thrasher had been added to the list. The shrikes gave most convincing proof of their



OUR FIRST SPARROW HAWK, PERCHED ON A TELEGRAPH WIRE, NEAR PETERSBURG, VIRGINIA

acific relations with smaller birds. Often they were seen surrounded by sparrows, juncos and other small birds; yet with uniform and utter indifference on both sides. Moreover, I saw one shrike pursue and capture an insect on the wing. This, of course, was an exception. Yet it was clear that these birds were in general intent almost entirely on crickets and grasshoppers.

Fifty miles south of Savannah, Georgia, on the twenty-sixth of the month we came upon our first swallows—about a dozen of them—skimming back and forth over the open water in a marsh beside the road. Swallows one month before Christmas! There could now be no doubt that we had reached the sunny South. A little farther along a dark, slaty-blue bird stalking sedately in the marsh proved to be our first Louisiana heron. Kingfishers had become suddenly numerous between Brunswick, Georgia, and Jacksonville. It was near the former city that we saw our first boat-tailed grackles—characteristically, in a marshy spot. Like a long-gearred model of the bronzed species, this is the southern version of our familiar blackbird of the lawns. We were not to find them abundant until we had reached St. Petersburg. Here many of them are semi-domesticated; contesting with pigeons, gulls, pelicans and lesser scaup ducks for food thrown to them by tourists.

Mockingbirds were numerous at Savannah and increasingly so on to Jacksonville. From Savannah the daily bird life was marked by abundant mockingbirds, shrikes,



"FROM SAVANNAH THE DAILY BIRD LIFE WAS MARKED BY ABUNDANT MOCKINGBIRDS"



A MIGRANT SHRIKE, "INTENT ALMOST ENTIRELY ON CRICKETS AND GRASSHOPPERS"

phoebes, kingfishers and sparrow hawks. "Shrike, shrike, sparrow hawk, shrike, mockingbird, shrike, kingfisher"—thus we tallied the birds seen on telegraph wires and, less frequently, elsewhere. The point in this endless game was to "guess" the bird as far as possible ahead of our speeding car.

Arrived at our destination, we found that it was unnecessary to scour the oak groves and the dense palmetto undergrowth of the woods to learn what birds were to be our most familiar new neighbors.

Not far within the city limits we parked our trailer in an accredited trailer camp, as the law required. On these grounds meadowlarks walked about with a confidence in the human race that was wholly new to my observation. They were ordinarily not disturbed by a person twenty or thirty feet away. They were in song at Christmas, and so was the house wren. Occasionally a ground dove—small, short-tailed, quail-like, flushed from the roadside as we walked about near the camp. This bird, in its setting of scrub palmettos, palms, oaks and long-leaf pines, under streamers and festoons of Spanish moss, is a fitting symbol of the inland birdlife about the "Sunshine City of the south." However, my chief delight was in the bobwhites. The small, dark, southern form of this species abounds even well within the city limits of St. Petersburg. Again and again I flushed coveys of these little quail in spots surprisingly urban. One does not need to be told that they are rigidly protected.

It would seem fitting to end this log of our journey South with a word picture of waving Spanish moss, flaming Turk's cap, gorgeous poinsettia, picturesque boat-tailed

grackles, saucy and intrusive mockingbirds and confiding bob-whites. But, how often the seemingly fitting, the reasonable and logical, are over-ruled by the unexpected in Nature! One comes to anticipate the unpredictable!

Nomadic for the past twenty years, I have never built a blind, cabin or other shelter, or set up my tent—whether in woods or open, at sea level or on the Continental Divide—but that some wholly unlooked for wildlife experience awaited me there. Invariably, whether as a substitute for what I had sought or as an addition to it, I have had some experience at once new, worthwhile and unforeseen.

Merely suburban in location, our trailer camp was on a main highway. A rather open grove of long-leaf pines stood directly across this road and opposite the grocery and filling station, the camp headquarters. One side of the grove was bounded mainly by a large, modern "home" for boys. Otherwise it was hemmed in by fine homes and bungalows. The latter occupied buildings extended to within two-hundred yards of none other than a nest of bald eagles! Conspicuous in the top of a dead long-leaf pine, the huge nest was in plain view of riders in thousands of passing cars.



"WE SAW OUR FIRST BOAT-TAILED GRACKLES—IN A MARSHY SPOT"

We had hardly settled before the well-known high-pitched notes of a bald eagle called my attention to this nesting pair. When we approached the nest to within two-hundred feet one bird left it. During the five minutes we remained at this distance both male and female alighted in the nesting tree as well as on other nearby trees; all in all with no pronounced alarm. As we retreated through the dense growth of grass and knee-high palmetto the female eagle returned to the nest and at once settled upon it, no doubt incubating her eggs. Upon inquiry, I was told by the camp proprietor that the eagles had first come here three years before, and that they had raised two young last year. If these birds and their nest gave a less distinctly "southern" impres-

sion than did the nearby mockingbirds, for example, the atmosphere of the picture soon grew on one until the whole scene was like a symphony, unmarred by one discordant note. After all, this was, of course, the southern subspecies of our national bird, while the streamers of Spanish moss that draped the otherwise bare branches of the eagles' tree spoke unmistakably of the land of warm winter sunshine to which we had "followed the birds".

Desert Sparrows

By SAM and GLADYS KNIGHT

DESERT SPARROWS have been daily visitors to our Arizona dooryard summer and winter for the past two years. We feel quite certain that they are the same pair that came when we first started feeding the birds, for they are completely at home and quite individual in their ways. Many of the other birds show little interest in bread crumbs during the summer months when insects and weed seeds are abundant, but the sparrows never fail us.

They interest us especially, not only because they are beautiful little creatures, really the aristocrats among



local sparrows, but because they are so definitely self-reliant and intent upon minding their own business. Never quarrelsome or intrusive, a larger bird may drive them away from a particular spot, but they are never in a panic as are some of the other small birds. One gets the idea that they intended to move anyway.

After the nesting season this past summer they appeared daily with four insistent youngsters nearly as large as they are. It was a picture to watch them, but we were unable to get a single good photograph of

them, although we tried repeatedly, with every artifice.

King Tulip

By
HENRICKS
HODGE



*Rich in history,
and once the cause
of a great spec-
ulative orgy*

FRONTISPIECE OF THE FAM-
OUS HERBAL, "PARADISI IN
SOLE" (1629) BY JOHN
PARKINSON. NOTE THE
TULIP PROMINENTLY CEN-
TERED IN THE DRAWING
ABOVE THE TITLE, A POSI-
TION SYMBOLIC OF ITS
GARDEN IMPORTANCE AT
THAT PERIOD.

FOUR centuries is a long time for popularity to endure. Yet for such a time the tulip has reigned supreme, the most popular of all our spring bulbous flowers.

The cause for such popularity is apparent. There is no real rival for his spring show. He pleases all with his kingly carriage and formal grace, at once appealing to all his subjects, commoner or noble, by being at times a dwarf of one foot or ascending the throne of his stem to a two or three foot height. For raiment he has a changeable rainbow cloak that ranges from the brilliance of the royal purple and violet through crimson, orange and yellow to the palest and purest of whites. Blue alone, as a color, is missing, but he atones for this with many and varied combinations of tint.

King Tulip's realm is the world. Originally hailing from the region bounding the eastern Mediterranean—in the uplands near the head-waters of the Tigris and Euphrates—his family has spread until members are now found not only in Turkey and Asia Minor, but also throughout much of Siberia, central Asia, China and Japan. Middle and southern Europe and North America are adopted homes; the others are ancestral.

Unknown in western European gardens until the middle of the 16th Century, the tulip was first introduced to Vienna in 1554 by Busbequius, the Austrian ambassador to the Sultan of Turkey. Regarding his journey to Constantinople he writes, "Having delayed at Adrianople one

day, we were going on towards Constantinople . . . and as we were passing through the district an abundance of flowers was everywhere offered to us—narcissus, hyacinths and those which the Turks call 'Tulipam'; much to our wonderment, because of the time of the year, it being almost in the middle of winter, so unfriendly to flowers. Scent in tulips is either wanting or very slight; they are admired for the variety and beauty of their colors. The Turks cultivate flowers with extreme zeal, and though they are careful people do not hesitate to pay a considerable sum for an exceptional flower".

Tulipam was not the Turkish name for this flower but rather a name that the Austrian ambassador attached by error. "Tulband" is the Turkish form of the Persian "dulband", signifying the cloth out of which a fez is made, and the same word from which our term "turban" is derived. It is probable that Busbequius misunderstood his interpreter's comparison of the inverted tulip flower to a tulband, or turban. Tulips are known to the Turks by the Persian word "lale".

But whether dulband or lale, the plant eventually found its way to Vienna. There, in 1572, the noted Flemish herbalist, Clusius, himself a great traveler, obtained a quantity of seed and bulbs recently imported by Busbequius. These he propagated on a large scale in his garden at Leyden. This was their debut in Holland. The year was 1591.

Interest in the bulb was immediate, but Clusius asked



AT THE LEFT A SIMPLE COTTAGE TULIP, AND, AT THE RIGHT, ONE OF THE "BROKEN" DARWINS. BELOW ARE TWO OLD TULIP DRAWINGS FROM GERARDE'S "GENERAL HISTORIE OF PLANTES" (1636). THE AUTHOR BELIEVED THEM TO BE THE LILIES OF THE FIELD MENTIONED IN THE BIBLE.



too great a price for his treasures, with the result that some of his tulips were stolen during the night. These increased, and, along with more recent importations, spread all through the Low Countries. The people rapidly became tulip conscious. Each year saw the creation of new varieties. The ease with which the flowers could be propagated brought many bulb farms into being. In 1634 the celebrated "tulip-mania," which lasted for two years, began.

Speculation ran rampant because of the high prices and the ease with which profits could be made from rapid natural increase of the stock. Tulips were sold at auction and all classes entered into the gamble. Bulbs were even sold and resold for a rise while still in the ground. At the height of the bubble—in 1636—one could often find varieties listed at prices that ran above those of the precious metals. One famous tulip, *Semper Augustus*, sold for 13,000 florins (a florin was worth about 48c). Another sold for 5500 florins; still another for 4600 florins, with a new carriage and two horses thrown in.

People grew tulips. They talked about tulips, the perennial attempt to obtain a black tulip being reflected in Dumas' *La Tulipe Noire*. Artists painted tulips, the well-known picture at Munich of Reubens walking in the garden with Helen Fourment, his second wife, shows tulip beds on all sides. People even ate tulips, for Clusius tells of an Antwerp merchant who received bulbs along with

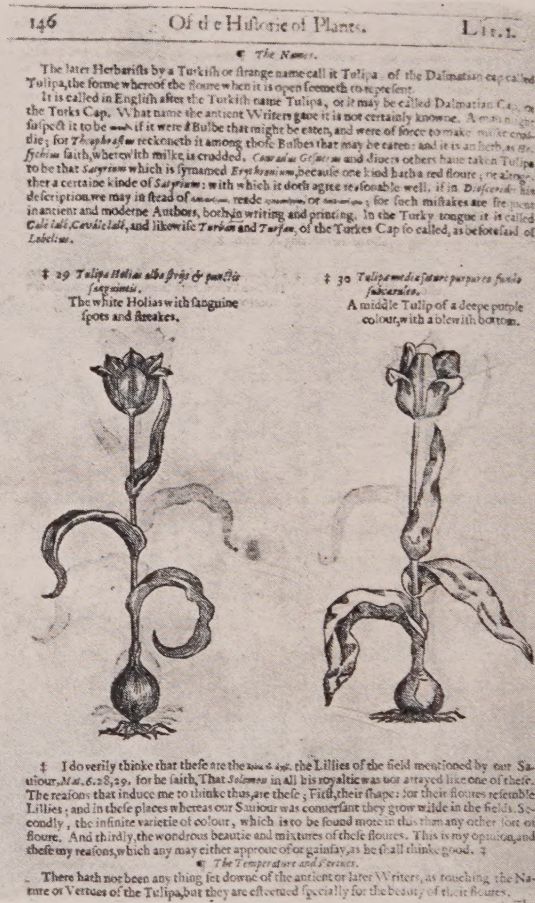
some cloth from Constantinople, and thinking them onions had them cooked and ate them with oil and vinegar.

Inevitable was the crash, and like so many similar bubbles it came quickly, there being so little value in back of such wild speculation. Governmental interference ended the trend towards ruin. The accompanying liquidation was made on a five to ten per cent basis. Thus passed the tulip-mania. Such times have never been repeated in tulip history, although there have been occasional high prices. As late as 1836 a tulip, *Citadel of Antwerp*, commanded 16,000 francs per bulb.

The culture of the flower resumed its normal course, for such a beauty could hardly do other than remain a favorite with both amateur and professional

gardeners. In the Netherlands the business of cultivation of the bulbs began, whereas in neighboring Flanders efforts were made to improve the blossom itself. So persistent and continual have these efforts been that these countries are now, as they were then, the recognized center of the tulip industry. Holland, in 1936, shipped 107,347,000 bulbs to the United States alone. The evolution of the modern flower types can be traced from those first varieties that found their way from Turkey to Europe.

There are at the present about one hundred species of tulips known, but through the centuries these have been so interbred that they are all badly mixed. The result is that the original mother species, like the mother species



A TULIP OF THE SIXTEENTH CENTURY. THIS IS ONE OF THE OLDEST TULIP PICTURES AND APPEARED IN THE WORK OF CLUSIUS, PUBLISHED IN 1576.

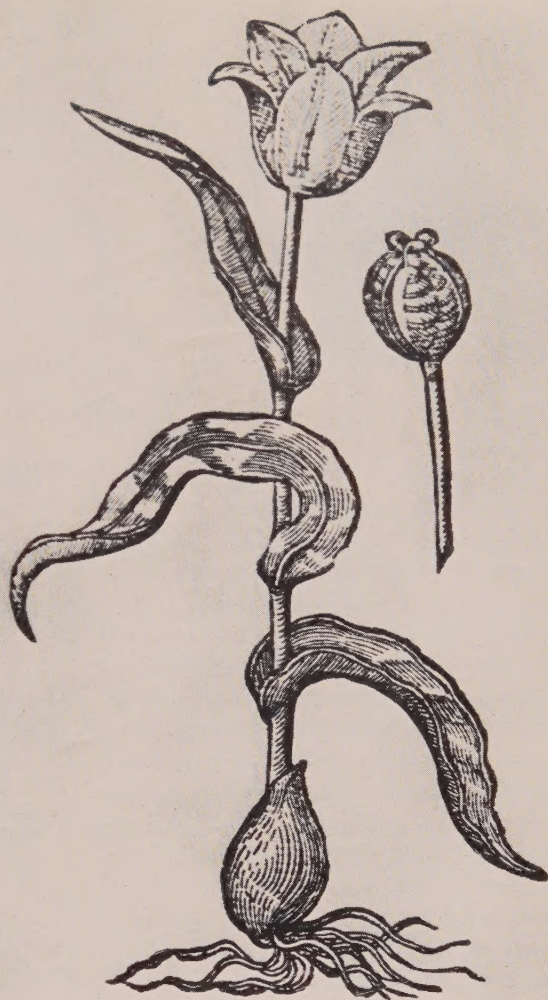
of so many cultivated plants, is unknown. Nor is it known how long tulips have been in cultivation. It is, however, probable that our large-flowered forms have been derived from one of the early small-flowered types in form similar to *Tulipa saxatilis*, or *Tulipa persica*.

This much is known. The species with long pointed petals were the original types so much in favor with the eastern florists in Turkey at the time of Busbequius' visit. Gardeners of that country favored the red and yellow colors. The state of floriculture at that time was such that the Grand Vizier Ibrahim Pasha kept a tulip gardener, Sheik Mohammed Lalizari (Lalizari literally means tulip grower). Thirteen hundred and twenty-three varieties of tulips were listed by him, and seventy-four were described in full.

With the introduction of the flower into Europe came the introduction of a new taste in petal shape. More and more the western florists tended towards rounded petals until, through the practice of artificial selection, the shape of a chalice cup became the highest expression of the flower. This expression has been carried down by the Hollanders to the modern day Darwin type, whose present form was forecast by Van Kampen in his *Dutch Florist* in the middle of the Eighteenth Century. According to him, the tests of a fine tulip were a tall stem, a cup large, well proportioned and not too long or egg-shaped, and lively bright colors. The demand for this type of flower was so persistent that all bulbs not fulfilling these standards—in other words all those having pointed petals—were cast off, and found their way to the tiny gardens of the cottagers where, recently, they have been rediscovered, preserved in all their original form—our own cottage tulips.

Tulip culture is not without its peculiarities. Most species and varieties are multiplied as bulbs, each planted bulb producing, through the growing season, offsets—tiny laterally-borne bulbs that in succeeding years will mature to ultimately form a bloom colored like that of the parent. "Widows" are bulbs that refuse to flower. "Breeders" are tulips self-colored in solid hues. Sooner or later in the life of a solid-colored breeder comes a stage that is spoken of as "broken", when solidity of color is lost to a vari-colored flower. Vari-colored tulips are hence broken tulips. These take many forms. "Bybloems" are those that possess a white ground color with lilac markings; "bizarres" possess a yellow ground color with red or brown markings; broken Darwin tulips are popularly called "Rembrandts". These variants have their sub-variants which give the connoisseur flamed or feathered forms of either bizarres, bybloems or roses. In addition, there are sold on the market species with frayed and much cut up petals—"parrots"—and the many petaloid types—"doubles".

Despite the careful breeding that has been done, the little long-petaled parent form of yesteryear has not yet



been suppressed. Every now and then in the tulip fields of growers appear "throw-backs" to this primitive form. Bulbs that bear such flowers incur the wrath of the gardener, and are destroyed as "thieves".

For a time in the early Eighteenth Century, King Tulip became, fortunately, a commoner. His popularity amongst the wealthy class was challenged by the many newly-imported American flowers, with the result that *Tulipa* became known as the poor man's plant. As such he captured the hearts of a new class and thereby insured his perpetuation. Even today the "plain dirt" gardener all over the world recognizes all the forms of His Majesty.

As the season progresses King Tulip takes three different forms. He ushers in the early spring in regalia befitting its awakening—in single flowered blooms of small and simple stature. He is at that time incognito and known chiefly as the "Duc Van Thol". Flowering later in mid-season he appeals to his old friends, the common folk, in the simple bright cloak, pointed cupped petals and medium stature of a cottage tulip. The season is finally closed in all the glories and richness of color that are only associated with the crimsons and purples of His Kingship, the Regal Darwin. These colors—and additional ones as the years pass by—he will flaunt gayly in every man's garden. So, deservedly, as the season rolls on, let us salute His Majesty—King Tulip!



Prehistoric America Powdered Its Nose



By ELLSWORTH JAEGER

Illustrated by the Author

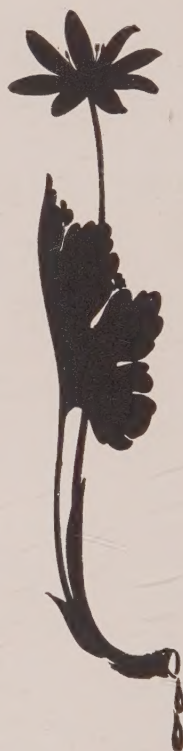
IN THIS age of rouge, lipstick and costly perfumes, it is surprising, perhaps, to discover that the so-called savage Indians were also cosmetic conscious. The finer arts of making up and the use of perfume, face powder and other toiletries were well developed among the Indians of this country and Canada. Since there were no beauty salons or toilet goods counters before the coming of the White man, the Indian went to Nature's cosmetic shop for beautifying agents. By combining ingenuity with Nature's bounty, he was able to obtain paints and powders, perfumes and soaps. Some of these are scents as elusive as the fleeting delicacy of spring.

The Indian is ever a lover of the beautiful. His choice of color harmony, his imaginative designs, his appreciation of music, of oration, and of the exquisite in Nature's perfumes, all indicate his esthetic soul. He is a lover of subtle odors and has used them frequently. Being a child of Nature, he chose the delicate perfumes suggestive of the wholesomeness and freedom of the out-doors.

One of the delicately-fragrant Indian perfumes was made by crushing the seeds of the columbine. The resulting paste was spread upon the clothing and the odor lasted a long time. It was especially perceptible in the dew or rain. So fascinating was this perfume to the Omaha and Pawnee women that it made quite a name for itself as a love charm.

Another fleeting odor was concocted from the common meadow rue. To capture the delicate fragrance of this plant, the fruits were gathered when approaching maturity, and stored. When used, they were rubbed and scattered upon the clothing in much the same way that lavender is used today. The fresh odors from the foliage of balsam and spruce were also appreciated, the odors clinging to clothing and robes for a long period.

Another Indian favorite was sweet grass. Most of us are familiar with sweet grass in basket form. To many



BLOODROOT GAVE
ROUGE TO THE
INDIANS

Indian tribes it was sacred, being used as incense. It was also used to purify those who were about to undertake important and dangerous work. Sweet grass was frequently burned, the smoke perfuming the clothing. Often it was carried in braided form, a few inches of it at a time being burned in the lodge to perfume it. Young men and women frequently braided it in their hair for the same reason. A love-lorn swain would often wear two braids of it around his neck.

Face powder and talcum powder were also used by the Indians. A favorite powder, used by the Indian women for their faces and bodies, was made from the red dry rot of the heart wood of the pine. Although it came from the tree in chunks, it was easily powdered. Sometimes iron oxide was mixed with it to make it heavy. In those days the pale-lily complexion was not fashionable. The rosy glow of the sun was then considered the ultra-smart skin color and was eagerly sought.

That "the colonel's lady and Judy O'Grady are sisters under the skin" was as true among the Indians as it is in any part of the world. Among the Red Folk, too, the "eternal feminine" was developed to a high degree. Although paint was used in religious rites, the

Indian belle was not averse to using it in attracting the other sex. In fact it became so popular and smart that Handsome Lake, the Seneca prophet, was outspoken against this form of vanity.

Another favorite powder was finely-ground corn meal. In pounding the kernels in the mortar, the Indians found that a fine white powder often resulted. This, they saw, adhered to their skin and made it soft and smooth, so another Indian talcum powder was discovered. This cosmetic was known to the Iroquois of the East as well as the Pueblo maidens of the Southwest. Since Pueblo swains love to loiter near the metates, where the girls are grinding corn, it is not unusual for the girls to beautify themselves by powdering their noses with the fine



corn meal, and avoid the shiny skin born of work.

The Indian babies, too, were powdered with it. Babies being babies, the Indian mother had the usual problems of infant care. But she had none of the many modern aids at her disposal and was forced to use the things that Nature provided close at hand. So she used the fine meal of the corn that made the skin feel silky. The Indian baby was liberally besprinkled with it to prevent chafing and was swathed in absorbent sphagnum moss from the swamps.

Another talcum powder substitute used by the Red mother was the soft silky down of the common cat-tail. In the North, where the winters are severe, it was necessary to provide good insulation for the little folk. To make the babies' cradle-boards soft and warm, the cat-tail down was here used, making a vegetable "eider-down" comforter. This down, too, was used to fill Indian children's moccasins, forming a soft warm barrier to snow and cold.

Although the poets have often sung of the gray-green moss that festoons the evergreens of the North, their fanciful rhymings are not half as poetic as were the thoughts of the Indian mother who first conceived it as down for her baby's cradle. For many years the Red mother has stuffed the cradles of little ones with this fragrant growth. Since the lichen grows upon health-giving pines and balsams, it was thought to have these qualities also, thus making a healthful, aromatic and soft bed for the papoose. Perhaps the hint came from another dweller of the woodland that used this lichen for a cradle. The parula warbler builds her nest of and amongst its pendulous strands. Old man's beard, as this lichen is known, was thought to be a remedy for whooping cough and epilepsy, as well as a hair restorer. It is a fuzzy, greenish-gray, moss-like growth found on twigs and branches of the trees of the North country.

Like our glamor girls of today, the Indian, too, used rouge. One plant in particular provided this, the juices

being painted on the cheeks to redden them. This was the beautiful spring flower, the bloodroot, once so common in our woodlands from Manitoba to Florida. The rootstock of this plant, also known as red puccoon, contains a bright orange liquid. When the rootstock is broken it looks as though it were bleeding, hence the name. Both the Indian men and women enhanced their dark complexions by reddening their cheeks with his root, especially on ceremonial or party occasions. The red dye was used, also, in painting sacred symbols upon the bodies of the warriors, as well as in decorating the various articles of their crafts.

Indian toiletries even include soaps and shampoos, not in the form of bars and bottles of course, for their soaps are of vegetable origin. In the deserts of the Southwest the Indian finds his soap factories underground in the roots of the yucca. There the Indian long ago discovered its properties, and uses it even today for shampooing and bathing. To make a soapy suds the Navajos shred the root and rub it in water until it bubbles and foams. They call this "foam" and wash their long black hair in it. White men who have used it speak highly of its shampooing qualities. It is used ceremonially as a cleansing agent by all the Southwestern tribes. While the root serves as a soap, the fruit is greatly relished, either raw or in jelly form.

Another Indian soap plant is the Missouri gourd, *Cucurbita pepo*, found in cultivation in the Indians' garden when America was "discovered". From the speeding transcontinental trains you can catch glimpses of this plant, growing throughout the arid country. It is well suited to

dry land, for its roots sometimes shoot six feet or more down into the earth. It is a coarse, creeping vine with large yellow flowers. The strong triangular leaves have a characteristic fashion of standing upright at attention in hot weather. Since the plant may spread twenty-five feet or more, it is a prominent growth in the gravelly wastes. Your nose will tell you of its presence, when you



PERFUME CAME FROM CRUSHED COLUMBINE SEEDS, AND CAT-TAIL DOWN LINED CRADLES



walk through it, for the crushed leaves give off a garlic-like odor. In California it is called "mock orange" because the ripened gourds look like brilliant golden oranges spilled upon the ground. The pith of the gourds and the roots give to the plant its chief claim to fame, for these yield a cleansing, soap-like lather often used by

Mexican laundresses. These folk know it as *calabacilla*. It is not especially recommended for skin soap, however, for it leaves a harsh, unpleasant feeling.

Thus we find that Nature not only provides the necessities of life to those of her children who look for her gifts, but indulgently and liberally feeds even their vanities.

Altar

By CORA MAY PREBLE

Within a house of worship
Shut in by walls of stone,
I spent some searching hours
Among the crowds—alone!
I sought to learn life's meaning—
Its mystery unveil.
I heard the hymns and sermons
But somehow they would fail
To give the strength I needed so—
I know not why, I only know!

I searched the hills and meadows
Afar from city spires,
And there I caught the anthems
Of sweet, celestial choirs.
I saw the treetops bending
Their heads in silent prayer,
And silvered flowers bowing
In sacred worship there!
I knelt upon the common sod—
And found communion, there, with God!

Abel Crawford in Stone

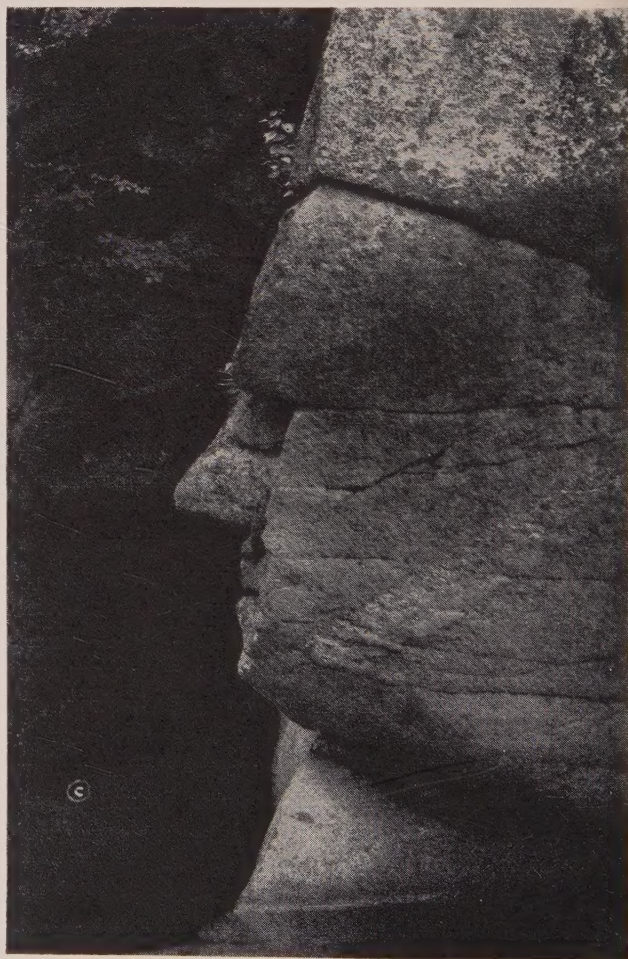
By ROGER BURNELL

THIS remarkable profile, as far as known, first came to notice on June 30, 1935, when I found and photographed it.

It forms a part of the rocky wall in the gorge of the Upper Falls of the Ammonoosuc River, close beside the road that runs from the Mount Washington Hotel to the Base Station, and about two and one-half miles on the way. It seems proper to name this remarkable profile in honor of Abel Crawford, the pioneer who, in the early part of the 19th century, was the first to lay out a trail from his home near the head of Crawford Notch to the summit of Mount Washington.

Near the base of the mountain the energetic settler, with the aid of his famous son, Ethan Allen Crawford, built a camp to serve as headquarters when they were guiding tourists to the summit, for, as early as 1820, an occasional small party came over the primitive roads to visit the great mountain. The trail from the Crawford home to the camp must have passed not far from this spot. Several famous botanists, and others interested in the natural products of this remarkable mountain, on whose summit the plants of the Arctic mingle with those of the temperate zone, made visits under Mr. Crawford's guidance.

This remarkable profile served in part for many years to support a foot bridge over the tempestuous Ammonoosuc, and in this position was effectually concealed from the view of the passerby, and this fact postponed its discovery. At the present time the profile is visible only from the



south side of the river, and this fact will continue to conceal it from the view of thousands of trail enthusiasts.



THE COMPLACENT COCK QUAIL POSES FOUR FEET FROM THE CAMERA

Other bird guests of the feeding tray at Woodwild go on with their meal that is liberally provided and for which they pay in song

A Naturalist Retreats

But only to more intimate Nature friendships

By H. H. SHELDON

AFTER thirty years as a field naturalist, I myself was caught in the trap of civilization.

Looking at my silenced guns and idle collecting kit, I said: "This is the end of natural history research". To my surprise, I found it was actually the beginning. Armed with a handful of mixed seeds and a pan of rolled oats, in two years I learned facts about the lives of wild creatures, right in the lap of civilization, that I had not learned in thirty years spent far afield.

Although naturalists have accumulated valuable data concerning the more obvious habits of birds and mammals, many a trained ornithologist or mammalogist knows little about their intimate daily lives as they are being lived. Science demands that these creatures of the wild be held in the forceps of death for study; and the trained collector often works in the field on the theory that a bird in the collection box is worth a dozen in circulation.

The result has been that birds of a feather have been neatly and conclusively put in their proper nomenclature. Throughout the country, in our institutions of research, bird and mammal specimens have been hoarded by thousands. Every species, with its finely-graded races, has been silenced and labeled. Our Government, alone, has spent nearly a half century in the study of birds and mammals in relation to agriculture. More than a half-million specimens have been acquired in the process.

But it is possible to reach the saturation point even in the hoarding of specimens. When broad general classifications are complete, and deviations recorded to an exacting degree, what purpose is served in splitting hairs and feathers any finer? Now that the ground work is laid, individual study of the lives of our birds and mammals

will build a vastly more important edifice of knowledge.

In my own case, I have found retirement from scientific field work reminiscent of the old lady who retreated from a cow only to back into a hornets' nest, which kept her so busy she forgot all about the cow.

Though I had to work in town, I chose to live at Woodwild, on the rim of the community. The property is situated near the base of the Santa Ynez range in Southern California. A virgin forest of oaks and the usual Sonoran accompaniment of luxuriant undergrowth bounds the range side of the property and enables us to forget the close proximity of civilization on the other side. The valley of a creek, which flows intermittently from the mountains, is the main thoroughfare for the numerous forest dwellers that have learned the game of follow-the-leader to Woodwild.

For the humans, Woodwild is a home, yet almost a part of the wild woods in which it stands. For the birds and mammals, it is a way-station of peace and plenty for the transients, a sanctuary for the year-round residents. The rule of "live and let live" operates successfully on both sides.

As so often happens, a small thing began it. We built a seed tray as a contribution to the birds who fill our days with song. Study of those that came to the tray, and experiments in ornithological dietetics, have resulted in a menu that is a tickler for all the palates of the wild. The menu is changed to suit the season. During the nesting season a particularly varied diet must be supplied if the widest variety of birds are to be induced to bring their young to the tray. Young grosbeaks, for instance, are fed at the tray exclusively on "over-ripe" bananas.



FROM THE BACK DOOR OF WOOD-
WILD ONE LOOKS ON THE SANTA
YNEZ RANGE, IN SOUTHERN CALI-
FORNIA, WHILE THE LUXURIANT
UNDERGROWTH IN THE FORE-
GROUND ENABLES ONE TO FORGET
CIVILIZATION AS SEEN FROM THE
FRONT DOOR

But bananas bring complications. Early one morning, looking out, I was puzzled by something lying on the seed tray, which, in the uncertain light, looked very much like a worn fur neckpiece. As I watched it turned into a live opossum. I walked out explaining, without animus, that we were not buying bananas for opossums unless they could sing. As I approached, it was evident the creature's predominant reaction was not fear, but annoyance at being interrupted. It emphasized the point by a deliberate turn about face and a renewed attack upon the feast. When I reached out to scratch its ears, it endured the intimacy momentarily for the sake of the banana, then swung over the edge of the tray like a monkey, dropped to the ground, and went waddling away to the woods whimpering with disappointment.

Later, we suspected it of stealing the eggs from a spurred towhee's nest, and J. declared an embargo on 'possums. A natural retribution spared us the necessity of imposing sentence. A coyote, venturing down from the mountains one night, left a trail that indicated that the 'possum had paid for his sins. It is quite likely that other sins, of which we were not aware, were expiated also. For we suddenly missed the whole family whose waddling walk we had come to recognize when they promenaded along the porch at night. And we actually *missed* them. Hearing one on the porch, we were always amused to hurry out and turn on the light. If it was a young one, he would tuck in his rear and scuttle. If it was an old one, he would stop, turn sidewise to stare at us with deliberate curiosity, then amble off as if the incident were really of no moment.

From the first our porch, running around two sides of the house, has seemed to be included in the itinerary of most of the nocturnal travelers. Sitting quietly indoors one night, we heard something walk past the front door with the soft tread suggestive of a cat. J. rushed out calling, "kitty, kitty, kitty!", and as promptly hurried in again. The breath of perfume which came with her through the door informed me that our visitor was quite another sort of kitty. It turned out to be the little spotted skunk, about the

size of a cottontail. We knew the tribe, but not intimately.

We do not mind skunks as casual visitors. If they are not annoyed or frightened they leave no lasting scent. But later that night, when we heard this one "singing" under the house, we pictured what might happen if she made her den and produced her young at our doorstep. Sooner or later one of us was almost certain to appear to her maternal heart in the light of an enemy, and how that one would, in consequence, appear to himself didn't bear thinking about.

For the moment, however, our anxiety was over-ridden by the pleasure of listening to her song. J. had never heard a skunk's song before. As a matter of fact, few naturalists have heard one sing. They make a plaintive sound, half-way between a twitter and a whistle, more suggestive of a bird than a mammal, and holding a quality of infinite yearning. Before morning J. was reconciled to this one's making her den wherever she liked. But apparently there was something not quite right about this homestead. She still visits us occasionally, but she built her den elsewhere, and we've never heard her sing again.

The inviolable law that some payment must be made for anything acquired came home first to J. when her newly-planted cosmos seedlings were eaten to the ground by the cottontails. Since both of us would rather study cottontails than raise any amount of flowers, it was actually no sacrifice to concentrate on ferns in the shady garden, and to enclose a rare and tempting plant in wire netting to impress without offending our gentle neighbors. On their part, they rapidly learned that when we filled the rolled oats pan, and put out alfalfa, sliced apples, and lettuce, and invited "bunny, bunny, bunny" dinner was served.

The big surprise was sprung on us while we were at breakfast one spring morning. Through the open window we watched the cottontails munch their rolled oats in full sunshine, at the foot of the seed tray. All was tranquil and as usual. Suddenly J. grabbed my arm. "Look! The garage!" she cried. I thought it must be on fire. I was even more amazed to see in front of it three pup foxes

WOODWILD, TO WHICH THE AUTHOR RETIRED AFTER YEARS OF SERVICE AS FIELD NATURALIST OF THE UNITED STATES BIOLOGICAL SURVEY AND THE CALIFORNIA INSTITUTE OF TECHNOLOGY. HERE HE FOUND THE BEGINNING, NOT THE END, OF RESEARCH



playing together while their wary parents looked on, one standing guard on a rock, the other nearby, grinning with complacent pride. What a picture of contentment. And less than a hundred feet away the cottontails, unseen and unaware behind rocks and ferns, munched oats and twitched their noses in equal contentment.

The mother fox, who knew these children must be unseen and unheard in daylight, contrived some sort of foxy look that sent the three pups scampering under the garage. This *was* luck. They were tenants, with us, at Woodwild.

Before they had time to settle down to their day's sleep, we hurried out with a pan of scraps. Peering under the garage we caught the amber glint of their eyes shining in the dark. We called them, whistled, and put down our offering. Back inside the house we watched. In a few minutes one venturesome pup popped out from between the slats that cover the underpinning of the garage. Stealing to the pan, crouching, sniffing, tempted beyond fear, he grabbed a piece of chicken and scuttled back to his den. As an ambassador of goodwill he was a complete success; for it wasn't long before the entire family came out, the pups squeezing through the slats at the front, the older foxes, too broad across the beam for this egress, slipping out through a larger opening at the end.

While we were enjoying the sight of these beautiful creatures eating our food in broad daylight, it suddenly dawned upon us they constituted a problem. The cottontails had come to trust us, to rely upon the security of Woodwild. They had prior rights over these sleek hunters.

We decided to catch the foxes and transplant them en masse to some distant hunting ground. After some experimenting, a box trap was constructed, baited with a chicken drumstick, and set before the slats under the garage just at dusk. In a surprisingly few minutes we had caught a pup. What a scared little waif he was as I picked him out by the nape of the neck and carried him to the clothes hamper which happened to be the only cage available. He was so quiet, so completely paralyzed with fear, he defeated us without a struggle. We returned to our original premise of

"live and let live"; and he returned to his brothers.

He recovered from his fright with astonishing quickness, and became the most daring of all, no doubt emboldened by his brief sojourn with his landlord.

It must be admitted that between the foxes, the great horned owls, and an occasional bobcat, the cottontail census dropped several points, rapidly. But the foxes were beguiled with cornmeal mush with meat scraps cooked in it. And as time went on our Br'er Rabbit family learned to take care of itself. They learned to associate safety with the human element and, completely reversing their natural habits, showed up only when the sun was well up and humans about. Their acquired habit of using the sounds of the household as their barometer was particularly useful to us in studying their lives together.

To take the edge off the foxes' nocturnal hunting lust, we fed them every evening at dusk. It wasn't long before they began to expect and even to anticipate the handout. As the hour approached, first one and then another would appear, sniff around the spot where they were fed, and look reproachfully toward the house. They knew so well what it meant when we finally came out and called them that often they dared to come to the pan the moment we started to walk away.

This daily feeding time became an event for us, as well as for the foxes. The pups would stand at the pan and chew, with half closed eyes and uplifted muzzles. But the wary older foxes would come to the pan, grab a piece of food, and trot to the top of a rock where they could watch in all directions while they gulped. When that bit was gone, down they would come for another mouthful, and back to the rock to eat it. They grew so accustomed to us that we could stand in plain view on the porch, thirty feet away, and talk to them while they ate. Our one regret was that the dim light prevented our catching this picture in the camera.

The pups, who played like kittens, were not long in discovering the porch. They played a game of tag here at day-break every morning, racing up the steps at the front, dash-

THE SPOTTED SKUNK WAS A VISITOR

In fact, one "sang" beneath the porch and for a time seemed to plan to live there

ing across and around the corner to the steps at the back, down into the myrtle and swish into a drain pipe that crossed under the road, and back to the porch again. It was barely light when I stepped out on the porch one morning just as they passed the door. I froze, and the next time around they actually ran over my foot, so intent were they upon their game.

While the pups played, their father sat on guard at the top of a rock in the garden, watching faithfully. The mother, with one eye on the scampering pups, snooped about on business of her own. Apparently the problem of feeding this family weighed heavily upon her mind, for several times we saw her up on the seed tray, cleaning up what crumbs the birds and nocturnal rodents had left. The pups seemed to sense her discovery of the slightest morsel of food, and would break off in the midst of the wildest race to dash up and stand expectantly under the tray while she mumbled crumbs.

Catching them thus, on several occasions I opened the back door (twenty feet away) and talked to them. The mother would jump down from the tray, trot off a few feet, and turn to watch and speculate upon my intentions. The father leaped for the woods, and disappeared; the pups retreated, playing as they went, romping over the garden



chairs, startled and fascinated by the one that rocked. But the mother was so anxious to take the bread I held out to her, she kept only a few feet beyond me as I walked toward her. Once she *almost* took the bread from my hand. She seemed so hungry I threw it down and walked away. She was on it almost before I had turned my back.

After a few months the time came for the pups to get their education in hunting, and the fox family suddenly deserted their table d'hôte fare. But I have my suspicions that the den under the garage has been leased for the coming season by Mrs. Urocyon, née gray fox.

A Living Memorial

By THOMAS G. SCOTT

NOR infrequently, nesting characteristics of the phoebe appear in literature, and much is written of the regularity with which this bird returns to a nesting site of former years. Upon occasion the location of last year's nest proves so attractive that the new nest is constructed upon the old one, thus creating a double structure. To such well-known habits Nature constantly adds the unusual, or perhaps unobserved, as an endless inspiration to the student.

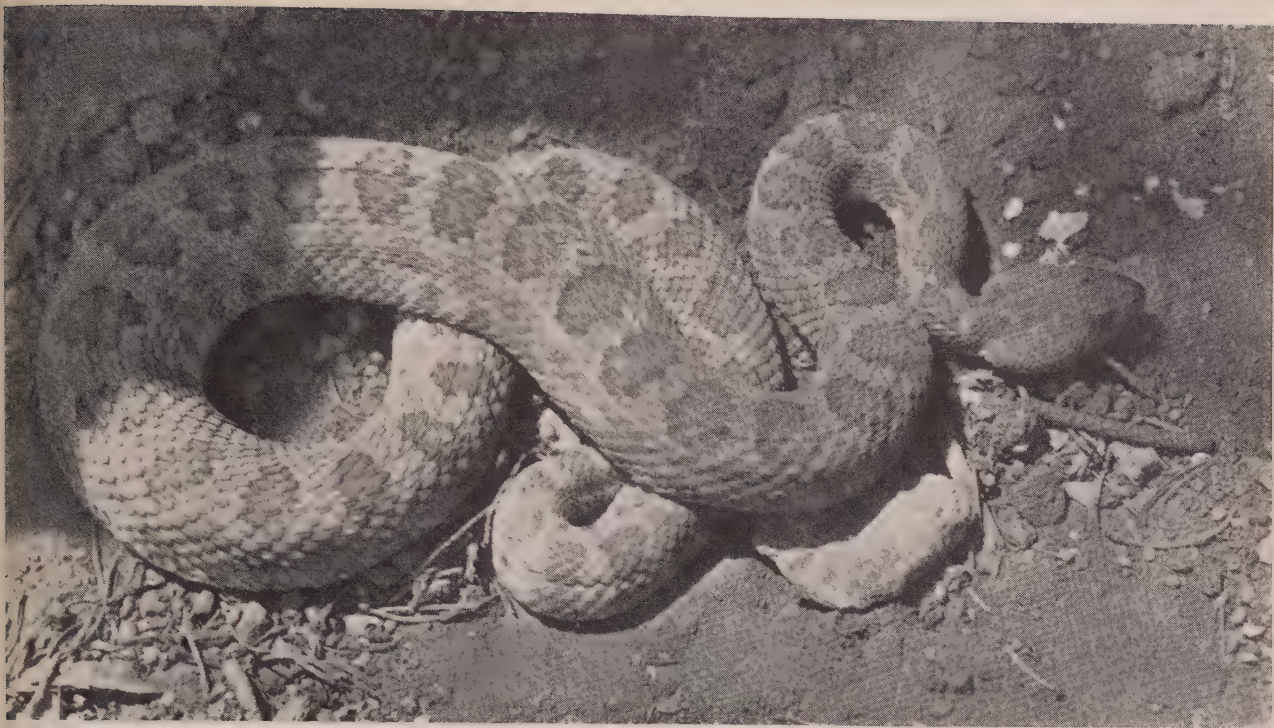
The records of bird lore were favored with such an addition when the double nest pictured in the accompanying photograph was found. The head of a dead phoebe may be seen to project from the nest material on one side, while the tail appears on the other. Close examination indicates that the bird died while on the nest and that at some later date another nest, possibly that of the mate, returned from his winter home, was built upon the well-dried body and the old nest. One with an inquisitive and imaginative turn of mind might offer many versions of this incomplete story of bird life oddity.



A STRANGE HOME

This is a double nest built by a phoebe. The upper half was built atop an old nest, although this contained a dead bird, perhaps the builder's former mate

Is it possible that the mate returned to this bier of the departed, to accept another mate and to build a new home upon the ruins of the old and to raise a family, a living memorial to the deceased partner? Now you guess.



THE GRAND CANYON RATTLESNAKE IS IN A CLASS BY HIMSELF

Looking like a prairie rattlesnake, this reptile is found only in and on the rims of that mightiest of canyons, the Grand Canyon of Arizona. He has changed in color and temperament from his kind

The Grand Canyon Rattlesnake

A remarkable environmental product

By RUSSELL K. GRATER

NOTED for years as the incomparable among the many great canyons of the world, the Grand Canyon of the Colorado River in Arizona is also rapidly becoming famous as the home of unusual and unique forms of plant and animal life. In recent years great strides have been made in biological studies, with valuable research being carried on by scientists regarding the Canyon and its effect upon past and present animal life in the region. The story of the effects of isolation upon certain species has been uncovered on the Kaibab Plateau, and more recently similar studies of this nature have been initiated. Perhaps the most notable of the numerous examples of changes in characteristics is the fascinating history of the famous Kaibab squirrel. Here is told briefly the tale of the Grand Canyon rattlesnake.

The story of the Grand Canyon rattlesnake, *Crotalus viridis abyssus* is as old as the Canyon itself. Like all the other animals in the region, the ancestral rattlesnake family was forced to adapt itself to a gradually deepening and widening canyon in an area that had been relatively level. However, this ancestral family—undoubtedly the forerunner of the prairie rattlesnake—was equal to the occasion. Those on the north side of the ever-growing gorge began to adapt themselves to different conditions

and it is believed that from this stock arose the present day Great Basin rattlesnake, *Crotalus v. lutosus*. South of the Canyon the original type continued relatively unchanged to become our prairie rattlesnake, *Crotalus v. nuntius*. Inside the Canyon, however, an interesting change was taking place among these rattlesnakes and their descendants that had not remained on either rim. Living in an ever deepening river valley these snakes eventually experienced entirely different living conditions than had been their lot before. The climate was more arid and desert-like; the temperature was higher; new forms of small mammals, their usual prey, were developing in the side canyons and on the brushy talus slopes. Red shales and sandstones, instead of the white limestones and sandstones found in the upper reaches of the Canyon walls, became the rattlers' home. At first, probably, there was little change in the general appearance of this canyon-type rattler. But gradually changes began to take place. The dark "saddle marks" along the back began to get a little duller and tended to disappear. The olive and yellowish tints of the body were replaced by a salmon or even vermilion color. And so today we find the product of these many centuries, the Grand Canyon rattlesnake, only along the rims and within the Grand Canyon itself.

From the day that I arrived in Grand Canyon National

Park until I left two and one-half years later, this rattler was the object of much of my spare time studies. At every opportunity I obtained records from reliable sources regarding this reptile, its temperament and habits. Field trips were taken into portions of the Canyon seldom visited by man, and each trip added data about this unusual snake. In Nankoweap Canyon, far out in the east end of the Grand Canyon, I had my most intimate contact with this salmon-hued rattler. Apparently living conditions are excellent in this area, and several specimens were found. Here I had a chance to study several at close range in their native habitat. Those that I studied seemed almost indifferent regarding my presence. Repeated teasing finally aroused one of them to the point of sounding a protesting buzz or two. One snake that I caught just as it was going into a rock pile showed only a frantic desire to escape when pulled out by its tail.

One day a member of our party went down to the creek to get a drink. After kneeling by a rock and lowering his lips to the water, he was almost scared out of his wits to see a rattler coiled by the rock not more than a foot distant! Carefully raising his head he drew himself out of danger and breathed a gusty sigh of relief. But

the rattler showed no desire for trouble, and vanished.

A few Grand Canyon rattlers have been collected on, and a short distance back of, the Canyon rims, but thus far there is nothing to indicate that their range may be more extensive. Apparently this species is content to stay within his natural sanctuary where it is normally free from any contacts with his greatest enemy, man. For the most part it is in danger from man only along the rim trails and roads, and along the more traveled Canyon trails, such as the Bright Angel, Kaibab and Tonto Trails. It is now uncommon to receive a report of a rattler being killed in these much-frequented areas. Indian Gardens, along the Bright Angel Trail, seems to be a favorite hibernating spot for snakes and several have been collected for study in that locality.

So today, in no danger of becoming exterminated in his unusual habitat, this salmon-hued, mild-mannered gentleman of the rattlesnake kingdom receives my vote as being one of the most unique features found in the Grand Canyon. May he continue to hold his own and forever comprise a part of that picture of wild and colorful beauty so characteristic of the many canyons and rocky platforms of the Grand Canyon of Arizona!

FRIENDLY LOONS

By ARTHUR H. FISHER

THOSE who have sought their recreation far from the haunts of man and have pitched their camp on the edge of some northern lake always have been impressed with the aloofness of the loon. I cannot imagine a wilder, more man-avoiding creature than this bird. In my younger days I have often matched my marksmanship against these superlative divers, and today I rejoice in the fact that I always was second best. Imagine, therefore, my surprise when I visited the U. S. Bureau of Fisheries Station at Wood's Hole, Massachusetts, and learned that adult loons become as tame as the trusting pigeons in the park of a busy metropolitan area within twenty-four hours after capture.

The capture, of course, is accidental, but many queer creatures become entangled in the nets of the commercial fishermen in the vicinity. One day last summer five adult loons were caught in the nets and turned over to the Bureau Station. These were released in an outdoor pool to join a happy family of harbor seals, sharks, rays and



ONE BIG HAPPY FAMILY

Loons, harbor seals, sharks, rays and other creatures of the sea that are caught in the nets at Wood's Hole spend the summer in a private swimming pool as guests of the Bureau of Fisheries. As one loon accepts a fish from a visitor, the seals wait patiently, hoping their turn will be next

other interesting marine creatures. After spending about twenty-four hours in unsuccessful attempts to "take off" from a fifty-foot water runway, they settled down to domestic life. After amusing the thousands of tourists who visit the Station annually, the loons were given their freedom, and it appeared that they took up their former wild existence as though no interruption had occurred.



THE SAGA OF THE SILK- WORM



Despite war and threats of boycott, substitutes and imitations, the silkworm remains milady's favorite insect, and its product reigns supreme. Dating back before authentic history to the tales of mythology, the secret of the silkworm was successfully guarded by the Chinese until the sixth century A. D. Then two agents of the Roman Emperor Justinian hid some precious eggs within their hollow staves, smuggled them out of China, and laid the basis for the spread of the culture that lasted through the centuries. Now, in restored Williamsburg, Virginia, gnarled old mulberry trees still grow, testimony to the royal command that a silk industry be established in the colony. Tobacco proved more profitable. Most of our silk now comes from the Orient, with some from the Mediterranean region.

It was eggs like those here shown that the Roman agents brought to their ruler. Here enlarged, they are actually pinhead size. From each one hatches a tiny, black, caterpillar barely an eighth of an inch long. Provided with chopped mulberry leaves, it eats the sap and grows, soon graduating to the succulent parts of the leaves themselves. Four times it sheds its skin, until, about twenty-three days after hatching, it is some three inches long. For another week it eats voraciously, etching little semi-circles from the edges of the mulberry leaves with its sharp-edged jaws. Thousands of silkworms, feeding together, rustle the leaves with a sound like falling rain.

Raising and guarding silkworms for their silk is known as sericulture. Attendants watch the quality of their food, the temperature of the room in which they live, and guard against rats, a serious menace. Cats are enlisted to discourage rats, and the cat is pictured with silkworms in Chinese literature and art.



After the final week of gorging, the silk glands on each side of the caterpillar's body are now full. It seeks a twig. A white gauze soon appears, as from the spinner's under jaw emerge two threads that unite into one and harden instantly. Moving its head in a figure-of-eight motion, the caterpillar spins itself in. After a day and night it is quite hidden. In three days the cocoon is finished. The caterpillar has given up its supply of silk and rests from its labors. Within the cocoon it changes, and, if left alone, within two to three weeks a thick-set moth with wings, eyes, but no jaws, will emerge. But such emergence would break the silken strands. Therefore, save for those set aside for the production of moths, and, hence, more eggs, all cocoons are treated with heat or steam to kill the occupant and preserve the silk intact. Sometimes the grower kills the caterpillar before it begins to spin, takes out the silk-fluid glands, treats them to remove the gland walls, and stretches the contents between two pegs. This is the "silk-gut" of the fisherman's line.

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If Nature's plan for the silkworm is not interrupted, a cocoon cut open soon after the caterpillar has completed its work will reveal the chrysalis, shown at the right. If undisturbed still longer the grayish-white moth seen below will finally emerge. It will soon mate, produce eggs, crawl about for a few days without eating, then die, its work being finished.

To provide the world with silk, man must interrupt the program of Nature. He must preserve intact the little silken cradle shown on the opposite page. For, save for the outer filaments, this cocoon contains a continuous strand, often half a mile long. It is estimated that in a pound of raw silk, as it is called in this form, there are seven hundred and fifty miles of fiber. Some five thousand of the cocoons would produce the silk for one kimono.

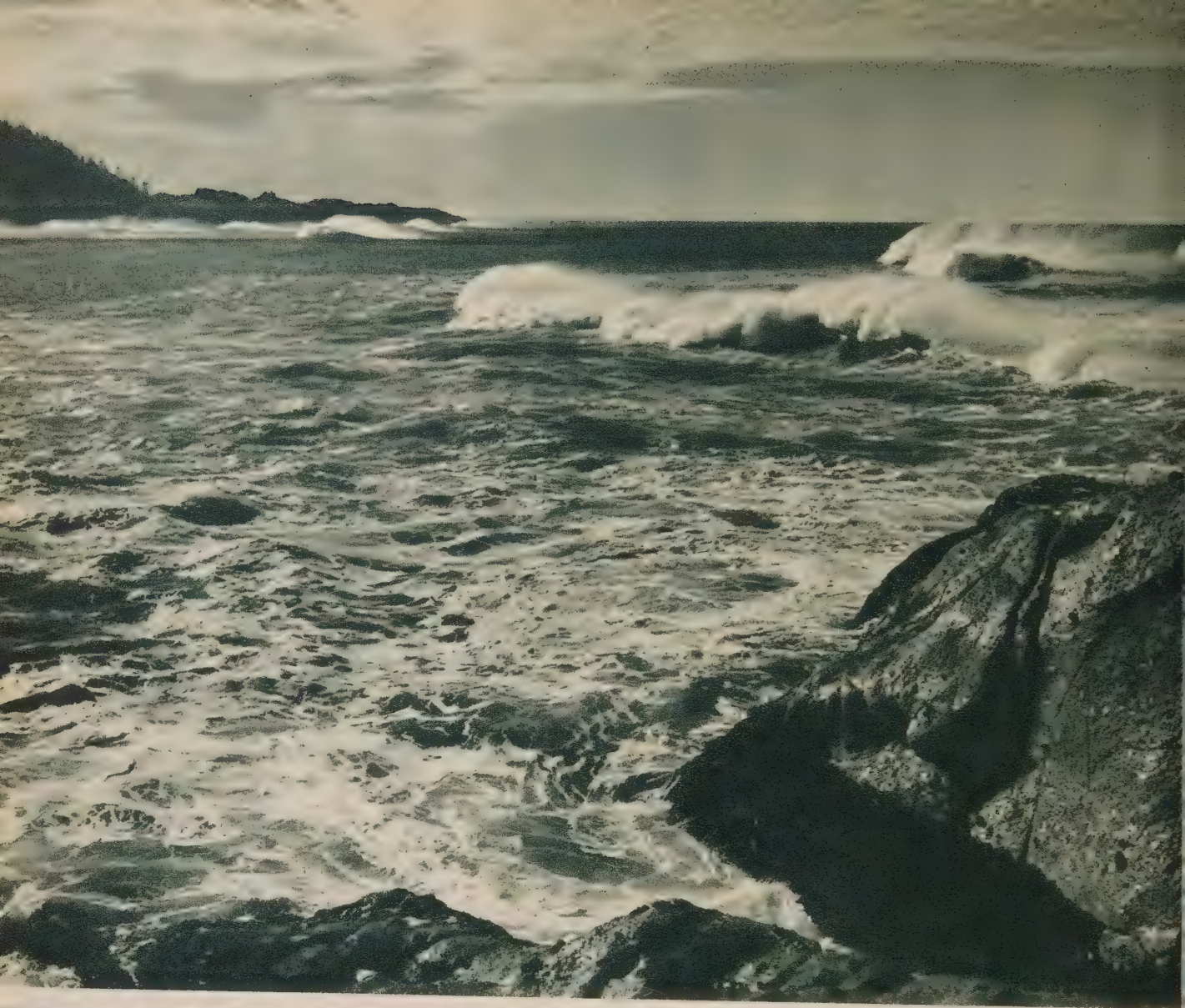
Unwound by hand or machine, a number of the silken strands are united in a single thread and twisted a certain number of times to each inch for strength. The number of twists varies, a large number insuring, in the woven product, the familiar crinkling seen in crepe.

Thus the silkworm is one of man's most important domestic animals. Contrary to popular opinion, silk is not produced haphazard in the mulberry orchard by caterpillars working on their own.

Human eyes carefully check the whole process from egg to egg: provide proper food and heat, care for ventilation, keep out dust. Untold generations of sheltered life have made silkworms delicate and sensitive. But from this care, and the labors of a little three-inch caterpillar, has come a great industry that produces many beautiful things.

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MOODS OF THE SEA

Photographs by Ray Atkeson

To know the sea well is to love it—and to fear it. It can be gentle and inviting, but never does it lose its promise of hidden power. It may roll softly and rhythmically. It may lash itself into a petty anger, frothing. It may unleash its frightening power in great foam-crested hills and deep, sucking valleys, tossing and shaking the craft that venture upon its bosom. Defying its vastness, and its mysterious depths, men go down to it in ships to conquer it for empire, for gold, for the mere bare needs of life. It is they who know the sea in all its moods; they who have found it both friend and foe.

Most of us know the seas best from the land, or from

Some Common Fresh-water Insects

By E. LAURENCE PALMER

This is the first of a series of special inserts that will appear every other month in Nature Magazine. Valuable to the school student, members of young people's outdoor groups, and to adult students of things in the outdoors, the graphic presentation of the material makes it of interest even to those only casually observing Nature. These inserts will be placed in the center of the magazine so that they may be detached and preserved separately.

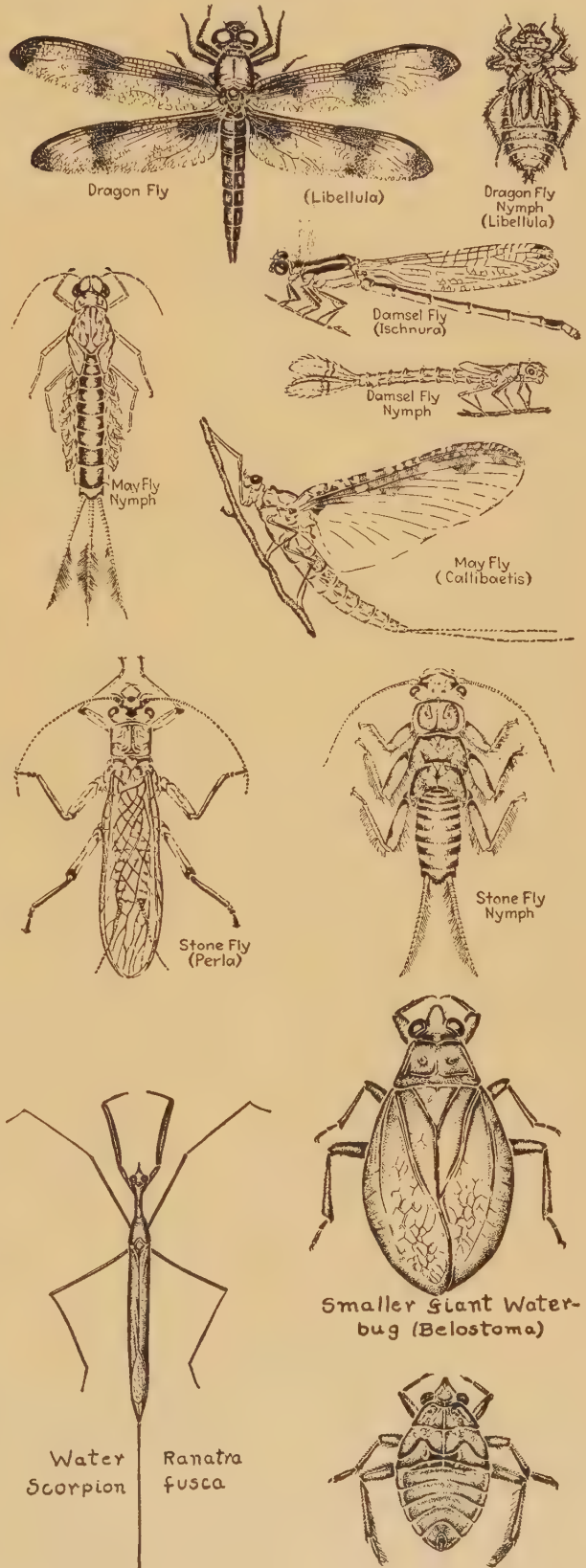
FIELDS, woods, gardens, deserts, sand beaches and rocky mountainsides are familiar places to most of us. Yet we usually think of watery places as little more than the sea, ponds, streams, lakes or rivers, not realizing that there is as much variety in kinds of habitats under fresh water as there is on the better-known drier land.

While the waters are not subject to the extremes of heat and cold of the dry land, there are other variable factors. Altogether they make legion the kinds of places in which different things may live. Important among the factors influencing life under water are temperature variation; the amount of light, oxygen, silt and other suspended substances; the quantity of salt and other chemicals; and whether the water is in motion. Important, too, are the kinds of plants or animals already established in a given place, since these creatures must eat to live, and, in so doing, will influence the numbers, and the interrelationships, of the things they eat.

Because of the fact that water is heavier than air it can exert more influence on the plants growing in it. A tree that can stand up under a strong gale of wind would be broken and uprooted by water moving even more slowly. Further, water is more likely to change its direction suddenly, as with beating waves or the ebb and flow of tides. Hence most of our water plants have weak stems, and instead of resisting the force of the moving water they merely yield to it and thus avoid being broken. Some even go so far as to be wholly free from attachment to the bottom and are washed hither and yon with the water. Not a few will be supplied with floats in which a gas of some sort may be found. This gas may or may not also be useful in the physiology of the plant. Often it is sought by under-water animals. And the problem of getting air—or water with the right amount of air dissolved in it—is related to the peculiar shapes we notice in insects of the water.

Insects of the Water's Surface

Skating on thin ice is supposed to be dangerous, but skating where there is no ice at all is commonplace to some insects. Many of these are so light that they do not break through the surface film and go at will over the water's surface. Others must rest flat on the surface. Still others pierce the surface only with small parts of their bodies, if at all. The water strider and the whirligig beetle are





WATER BOATMAN



BACK-SWIMMER



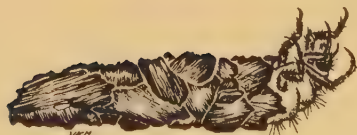
WATER STRIDER



DOBSON FLY AND LARVA



CADDIS-WORM
IN ITS CASE
AND THE CADDIS-FLY



probably the best-known surface insects. The strider rest on its toes, using those of the front pair of feet to scoop up food, while the middle pair serve as support, and the hind pair provide the driving force of movement. The whirligigs have been dubbed everything from apple seeds, because of their odor, to submarine chasers, because of their actions. Their eyes, and the position of attachment of their legs, are worth observing carefully. Both the whirligigs and striders eat animal life that may come to rest on the surface of the water. Either may be found in still water, or on rapidly-moving streams.

Insects Beneath Quiet Waters

The important places beneath quiet waters are—in open water—among the plants, if any, and on or under the surface of the bottom. As on the dry land, many animals lie in wait in such places for prey. Fish may dart into the weeds for food hidden there, and back-swimmers may come out from the weeds for food in the open water. In general, the commoner and more easily seen insects of the open water include the water boatmen, which row their way gracefully right side up, now and then coming to the surface for air. Associated with them may be the back-swimmers, which have the general appearance of water boatmen but swim on their backs. While the boatmen are out and out plant eaters, the back-swimmers feed only on animal life. They are able to inflict injury if squeezed, and should be handled with care because their bites are as unpleasant as the stings of bees.

The open water, or the weeds near the open water, may be the home of the giant water-bugs, or electric light bugs, which come out at night to fly from pond to pond and are attracted to lights. These giants of fresh-water insects also are able to inflict an unpleasant bite. Possibly the most interesting thing about some of these bugs is that the female smaller giant water-bugs place their eggs on the backs of the rebellious males who mate with them.

Not infrequently the open water near plants may abound with the log-cabin houses of caddis-worm larvae. These float about, or are dragged about easily by the insect living inside and sticking its head out to eat. No one would fail to recognize these animals from the name log-cabin. Other caddis-worms in the tangled vegetation of quiet water use plant materials to make their houses. Some of these roll a leaf into a coil about their bodies. Others fasten small stems together so that they look like a bundle of sticks. Others crawl inside some hollow stem for a home.

Beetles of a number of kinds swim about in quiet waters, either in the open or among the weeds. Most interesting is the way they carry their air supply. The water scavenger beetles carry it smeared over the under side of their bodies in a silvery film. The diving beetles carry it under their wings, a surplus often sticking out as a bubble at the rear. Still more interesting is the diminutive haliplid beetle not discussed in the charts of this section. This little beetle has broad plates under the body to which the hind legs are attached. Under these plates, which are not unlike trouser pockets, the little beetle carries its air sup-

ply. Any general study of the beetles of quiet waters will include the small diving beetle that is sometimes called the "skip-jack" beetle because of the quick movements it is able to make in the water and out of it.

The larvae of most beetles of the waterways are to be found among the water plants. There they crawl about generally seeking some other small animal as a meal. Of the beetles so far mentioned, the haliplid beetle is the only one that lives mainly on plants.

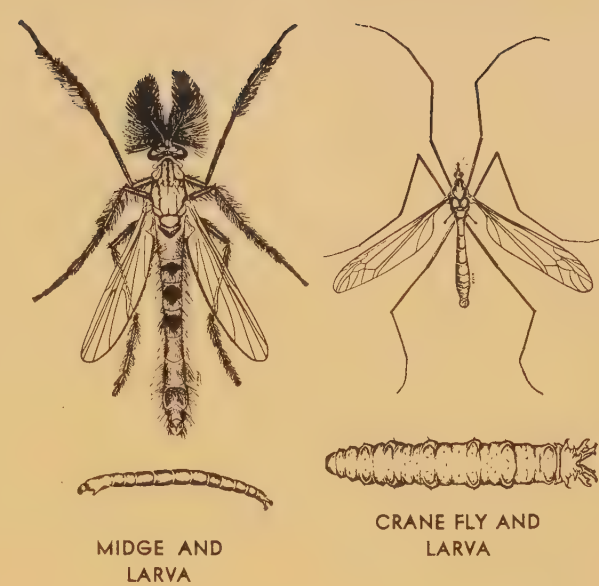
Other larvae, or nymphs, that may live among the weeds are those of the damsel-flies and dragon-flies. Some may-fly nymphs also may be found in such places. One easy thing to remember about the may-flies and damsel-flies is that each usually has three tail filaments. This is not always true with the may-flies, but it is generally so. When the may-fly nymphs move their bodies they bend them forward and backward. The damsel-fly nymphs, on the other hand, move their bodies sideways. The dragon-fly nymphs either walk with their legs or drive themselves through the water by expelling water suddenly from the back part of their bodies.

The mud at the bottom of a pond creates interesting problems for life there. It may give protection to forms too weak to protect themselves, but it may also be too soft to support an insect with any considerable weight. In such a case the insect must make its way by swimming, or by letting some portion of the body stick out of the mud to get fresh water. This is well shown in the water scorpion. This insect has two filaments at the end of the body. These fold together to make a long hollow tube, which the scorpion sticks through the surface film for a new breath of air. In the meantime it may continue to forage in the water beneath. Creatures known as rat-tailed maggots, *Eristalis*, may sometimes be found in the soft mud. They use somewhat similar means to get fresh water and food at the same time.

Some of the may-fly nymphs that live in the mud protect their gills from the ooze and silt by a sheath that closes when necessary.

Insects in Moving Water

Moving water has its advantages and its disadvantages to aquatic insects. If they can avoid being washed away



MIDGE AND LARVA

CRANE FLY AND LARVA

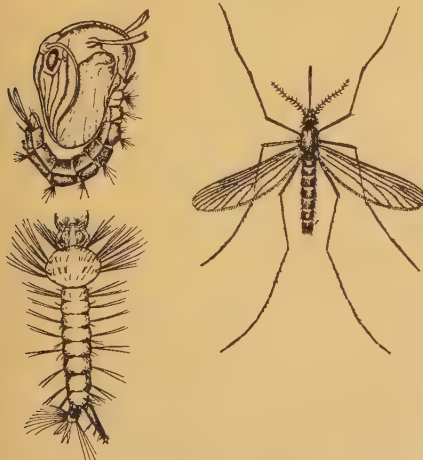
their food may come to them, otherwise they may be forced into an environment not to their liking.

One common way in which insects avoid being washed away is to weight themselves down with small rocks. Look under almost any stone in a swiftly-moving stream and you may find small pebbles fastened together with silk. When these dry out the larvae of some caddis-flies, or possibly a midge larva, may crawl into the open. The latter are less likely to use the stones as anchors. Some of the caddis-fly larvae build beautiful stone bungalows in which the pieces are fitted together as nicely as a mason could do it. Still others build stone houses that look like coiled snails. Others merely fasten the stones together crudely and loosely.

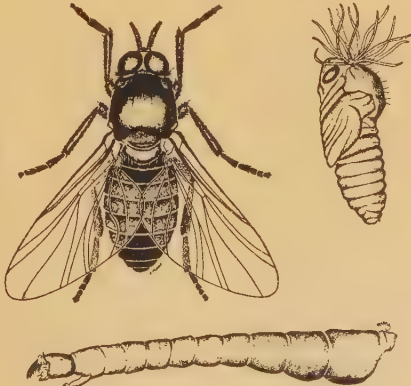
A second way insects avoid being washed away is by stream-lining. This device is found in the nymphs of many may-flies of swift water, the nymphs of most stone-flies, and, especially, in the larvae of the parnid beetles, *Elmis*, which look more like crustaceans than beetle larvae. Most of these creatures are stream-lined above, which tends to force the flattened lower surface to the rock or bottom on which the animals rest.

Suction discs and adhesive silk also help insects of swift waters. The larvae of (Continued on page 484)

MOSQUITO, *CULEX PIPPIENS*, AND ITS LARVA AND PUPA



THE BLACK FLY AND ITS LARVA AND PUPA



RAT-TAILED MAGGOT AND LARVA AND PUPA



NAME	DRAGON-FLY	DAMSEL-FLY	MAY-FLY	STONE-FLY
DESCRIPTION	Adults, 4-winged; wings spread at rest; large eyes; relatively slender abdomen; medium-sized legs; most active fliers; favor sunlight. Nymphs, aquatic, with conspicuously hinged lower jaws; some burrow (<i>Gomphus</i>); some sprawl (<i>Libellula</i>), some climb on water plants (<i>Aeschninae</i>).	Adults, slender-bodied with netted wings that fold along back when at rest. Heads and eyes, large. Males, frequently more brilliantly colored. Incomplete change. Nymph, aquatic, with 3, plate-like, gill "tails", and a sideways movement of body when in motion.	Adults, thin, delicate wings held over back in rest. Usually with 3, but sometimes 2, long, delicate "tails" and with front pair of legs held conspicuously forward. Incomplete change. Nymphs, aquatic, with 2 or 3 "tails" and gills from side of forepart of abdomen.	Four-winged insects with chewing mouthparts, sometimes not functioning in adults. Incomplete change with the nymphs aquatic; with gills most commonly just behind base of legs in pads and with two "tails". Adults able to fly reasonably well.
WHERE FOUND	Darners fly high; skimmers, lower; 10-spot (figured) at height of 15 feet; amber-wing at 6 feet; argias at 2 feet.	Adults relatively slow flying. Nymphs in ponds or streams but probably most common in quiet water.	Adults in great flocks along fresh-water rivers, lakes and ponds. Nymphs under water.	Adults on land or flying. Nymphs in well-aerated water, usually where it flows.
RANGE	Two American families, the Aeschnidae and the Libellulidae; the former including conspicuous <i>Gomphus</i> , <i>Anax</i> and <i>Cordulegaster</i> ; the latter, <i>Libellula</i> and others.	Two American families, the narrow, or stalk winged Coenagrionidae, and the generally more beautiful and brilliantly-colored Agrionidae.	Some hundred species known from the United States, although this probably does not include all to be found in the area.	Four American families in the order—the Perlidae with 14 genera; the Nemouridae, with 9; the Capniidae, with 3, and the Pteronarcidae, with 1.
CLASSIFICATION AND LIFE HISTORY	Class Hexapoda. Order Odonata. Sub-order Anisoptera. Males have single appendage at end of abdomen; may hold female by neck. Females may drop eggs in water, or insert them in mud or plant tissue. Incubation usually long, though sometimes about 2 weeks. One brood a year beginning in June. Adults gone by August. Incomplete metamorphosis.	Class Hexapoda. Order Odonata. Sub-order Zygoptera. Males hold necks of females with claspers. Male sex organs near front of body. Females may lay 200 to 300 ovate eggs, 1/25 inch long, by inserting in plants in water; hatch in 3 weeks to several months, and in 10 to 14 stages spend 225 to 624 days.	Class Hexapoda. Order Ephemera. Family Ephemeridae. Adults live but a day or two, mating in flight. Females drop eggs or place them under water; 500 to 1000 per female; hatch and develop through immature stages in 6 weeks in some species. Others require longer. Molt in adult stage, unlike other insects.	Class Hexapoda. Order Plecoptera. Family Perlidae. Mate out of water. Females drop eggs in masses in water; 200-800 eggs hatching into nymphs, which cling to stones under water and mature in 1, or more—probably 2 or 3—years, then leave water; transform into adults from some elevated point.
BEHAVIOR	Feed solely on animal matter as adults and as nymphs, the different species confining activities to particular regions, but representatives being found in most places in air and water. Perfectly harmless at all times. Often highly inquisitive, investigating a great variety of possible sources of food supply. May roost in considerable numbers at night.	Food of nymphs, probably any aquatic animal life that may be captured; of adults, insects that may be captured in flight even though flight is poor. Protection, largely that of remaining hidden, or because of color like that of the environment. Can hardly be thought of as great defenders of selves.	Food of adults normally nothing, since mouth parts are not developed. Immature forms feed almost entirely on submerged aquatic plants, oozes and slimes of the bottoms of waterways. Little protection outside great numbers and inaccessibility of place where growth takes place. Some burrow in mud.	Food of nymphs small forms of animal life captured while prowling over or under submerged stones in a stream. Adults may eat nothing, but die soon after eggs have been deposited. Protection against current by streamlined form; from animal enemies by position in current and by ability to hide.
REACTIONS TO HEAT AND LIGHT	Essentially lovers of bright sunlight and warm weather, though the species vary in this respect. Are commonly parasitized at different stages, particularly as eggs, by wasps.	Essentially summer insects, the winter being spent in the nymphal stages. Adults favor sunny days for activities, and most do not leave waterways often.	Great swarms may leave water at same time, probably definitely controlled by light condition; usually transform about middle of July.	Adults attracted by lights. One, <i>Capnia pygmaea</i> , a small, dark snow-fly, common on snow in early spring in East, climbs posts and walls to mate.
USE TO MAN AND PLACE IN NATURE	Essentially useful as destroyers of insects such as mosquitoes and gnats that may annoy man, but may prey also on useful insect species. Possibly the most beautiful and graceful of all insects and surely among the more interesting.	May be thought of as food for fish and as scavengers of waterways, although food is essentially living animal matter. Make interesting and sometimes beautiful insects to watch along waterways.	Unquestioned value as basic food for many valuable fishes. May seem to be pests when adults are numerous but eat nothing in that stage. Read Franklin's "To an Ephemera" in his <i>Autobiography</i> .	In general useful food for fishes and scavengers of waterways, but a Western species, <i>Teniopteryx pacifica</i> , a serious pest of fruit tree buds in adult stage. Adults make excellent trout bait in season.

WATER SCORPION	ELECTRIC-LIGHT BUGS, GIANT WATER-BUGS	WATER-BOATMEN	BACK-SWIMMERS	WATER STRIDERS
Like slender sticks, with front legs modified for grasping. Swimming and walking done with second and third pairs of legs. Filaments at end of body close to form breathing tube that may be thrust up to air. Sucking mouth parts. Not conspicuously colored.	The larger <i>Lethocerus</i> , between 2 and 3 inches long, flattened, with short, stout, grasping forelegs and short, stout, piercing beak. Wings folded across the back, the rear portion being flexible. <i>Belostoma</i> , about 1 inch long. <i>Abedus</i> , with prominent middle keel beneath.	Shaped like blunt-ended boats with hind pair of legs modified for swimming; middle pair, long, slender and with two claws. Males, with asymmetrical four last segments under abdomen. Swim right side up but show air film beneath when seen from below.	Bodies, deep-boat-shaped; backs are held downward, light-colored. Hind legs of <i>Notonecta</i> and <i>Buenoa</i> flattened for swimming. Eyes, large. Furrow on underside enclosed by hairs forms an air chamber into which air is forced by the hind legs.	Slender-legged bugs with slender bodies. The middle pair of legs the longest, with tips resting lightly on water. Hind pair rest an additional section of leg on water. These two pairs drive them over water surface. Some with short wings, and some wingless adults.
Either in deep water among trash or at surface or even basking in sun and entirely dry.	In water, among trash, or under bark under water. May be found flying about at night or on ground.	Lakes, streams and fresh-water ponds of moving or stagnant water.	<i>Notonecta</i> (12 species) float at pond surface. <i>Buenoa</i> (6 species) swim slowly under surface.	On the surface of either fresh or salt water, often crowded together in flocks. More common on quiet water.
A slender genus, <i>Ranatra</i> , common. A $\frac{3}{8}$ inch, flat genus <i>Nepa</i> , less common; and an intermediate <i>Curicta</i> of the south-central states.	Four common genera in the United States. Some, from Brazil and Guiana, 4 inches long.	Some 55 species in 6 genera in one American check-list of the family.	<i>Notonecta undulata</i> general over the United States wherever conditions are suitable.	Some 20 species in America north of Mexico, representing 7 genera. Nine of the species of the genus <i>Gerris</i> common in East. Others in West. <i>Halobates</i> lives on ocean.
Class Hexapoda. Order Hemiptera. Family Nepidae. Mating act a prolonged one. Eggs laid under water in decayed vegetation or on live plants, inserted in holes. Hatch in 2 to 3 weeks into young which go through 5 stages to adult. About 40 days from egg to adult. Prolific egg layers.	Class Hexapoda. Order Hemiptera. Family Belostomatidae. Mate in water, intermittently with egg laying. In <i>Abedus</i> and <i>Belostoma</i> , females glue eggs to back of resentful males. Eggs hatch in 1 to 2 weeks by lengthwise split in egg freeing nymphs which cluster at surface, the older eating the younger. Nymph stages of development, 5.	Class Hexapoda. Order Hemiptera. Family Corixidae. Males chirp by rubbing front tarsi against beak or opposite leg. Yellow, top-shaped eggs laid on submerged vegetation, or, in one species, on living crayfish. Young show eye-spots in four days. Stages of nymphs, 5, each more nearly like adult than predecessor.	Class Hexapoda. Order Hemiptera. Family Notonectidae. Mate beneath water in spring. <i>Notonecta insulata</i> glues white 2.21 mm. eggs to submerged stems. These hatch in about 3 weeks into young resembling adults but with shorter wings and other differences. Some male backswimmers make shrill sounds by rubbing certain areas.	Class Hexapoda. Order Hemiptera. Family Gerridae. Mate from early spring through the summer, the males sometimes first cutting off wings of females. Eggs laid on supports at water surface, hatch in about 2 weeks by longitudinal split. Young jump about actively and resemble adults. Nymph stages, 5, each lasting about a week, normally.
Food, other animals, mostly insects that are caught and held by forelegs while juices are sucked out. Prey is caught by lying in wait for it. Protection from enemies by inconspicuous nature. Winter as adults. May chirp, when taken from water, by jerking rigid limbs and with help of a rasp on each shoulder.	Food, animal life varying from insects to fish captured and held by strong forelegs and pierced by beak. Known to vanquish fish 4 times their own length. Protect selves by escape, either by swimming or flight, or by hiding under submerged materials. Breeding period, May to August, a female laying a number of 75-150-egg batches.	Food, ooze and slime almost entirely of plant origin. Winter as adults, although some young have been found in January. May migrate from pond to pond easily, thus easily populating isolated bodies of water. Migrate by flying. Protection, by great number, escape and inconspicuousness.	Food, largely small aquatic animals caught by pursuit and killed by stinging or by holding with legs. Some secrete milky substance from thorax. The stings are sufficiently severe that the animals should be handled with care by humans. Normally they would sting only when held too tightly. In captivity, may be fed mosquito wrigglers.	Food, other insects captured at or near the surface of the water sometimes even by jumping into the air for them. May feed on snails near water edge as a pond dries up, laboring greatly to free snail from the mud but succeeding. Protection, by escape or flight, but may be easily drowned if forced to break through surface of water.
When first brought into strong light avoid it but soon react by going towards it. May hibernate at other times of the year when oxygen content of water is abnormal.	Go towards contacts and towards light at certain times.	Young cannot thrive in boiled water. Are more active on dark days than on bright, and probably are active through the night and through the year.	Unless water is aerated in aquaria the animals can hardly be reared successfully through life history. Some mortality during molting. Nematodes effective enemies.	Some species in early stages can swim about under water, standing submergence in this way for some hours; others cannot stand this. Highly nervous in captivity.
Not of economic importance except as checks on the multiplication of small water life. Interesting because of ways of breathing, of capturing food, of locomotion and of reproduction. May be reared on cockroach nymphs.	Probably not useful except in keeping animal life in check in waterways. May be real pests in fish hatcheries where they may destroy both fish, fish eggs and fish food without themselves contributing enough food to compensate.	Adults and eggs used as food in form of flour, by man and birds, in Egypt and Mexico. Imported for this purpose into England by the ton, each ton equalling about 250 million individuals. Serve as scavengers.	Serve as good checks on such aquatic insects as mosquitoes, which are dangerous to man's interests. Make interesting aquarium pets.	To be reared in aquaria they must be free from disturbance. If kept in a small jar they may dash themselves recklessly against the sides. May be fed dead flies or other insects.

NAME	FISH-FLY, DOBSON HELLGRAMMITE	CADDIS-FLIES	CRANE-FLY	MOSQUITO
DESCRIPTION	Adults, wing-spread, more than 5 inches. Males with long, slender, crossed jaws like two hooks. Females with shorter, stouter jaws. Larvae aquatic, breathing through gill-tufts at bases of abdomen segments.	Adults, with four wings densely covered with long fine hairs and held at rest like a roof over the back. Antennae, long, active and usually forward-pointing. Mouth parts of adults not developed. Hind wings, shorter but broader than the fore-wings.	Adults, long-legged, sometimes 2 inches long, with 2 wings and a V-shaped suture between wings. Larvae, usually grayish-white, with or without appendages at one end, an inch or more long and about $\frac{1}{8}$ as thick. Pupae, slender, mummy-like and commonly in gravel.	Small, well-known flies, the males with feathery antennae. Wing-margins, fringed; beaks, stout. In <i>Culex</i> , resting position with body horizontal; in <i>Anopheles</i> , the malarial mosquito, body is held at an angle. Larvae aquatic as are the pupae.
WHERE FOUND	Adults flying near waterways or about lights. Larvae, under stones in moving water.	Adults fly about in air or perch on supports, more commonly near water.	Adults in air or among damp vegetation. Larvae on land, under wet soil or in water. Pupae, commonly in gravel.	Adults in air. <i>Culex</i> larvae hang from water surface at an angle; <i>Anopheles</i> lie along under surface.
RANGE	(The Family Sialidae has 2 genera of alder flies and several fish-flies, 6 being found in United States and Canada.)	Some 13 families of caddis-flies in North America, the larvae being conspicuously different by the houses they build.	The superfamily Tipuloidea includes in America the Tanyderidae, the Ptychopteridae, the Anisopidae and the Tipulidae with 3000 known species; 500 American.	American <i>Anopheles</i> , 9 species, 4 being malaria carriers. Many house mosquitoes of genus <i>Culex</i> . Some of the subfamily Corethrinae are not blood suckers. Many tropical species.
CLASSIFICATION AND LIFE HISTORY	Class Hexapoda. Order Neuroptera. Family Sialidae. Subfamily Corydalinae. Mate outside water. Eggs laid in white, blotchy masses, sometimes 1 inch across, on objects over water, about 2000 to a mass. Hatch into larvae that enter water to develop for about 35 months. Then leave water to pupate for a month in a cell under cover.	Class Hexapoda. Order Trichoptera. One family is the Limnophiliidae represented by the genus <i>Limnophilus</i> whose larvae build log-cabin-like houses of vegetable material. May be larvae for 11 months, from June to May, then make a different case, sometimes of shells in which pupae may be formed for about 3 weeks before adult stage.	Class Hexapoda. Order Diptera. Family Tipulidae. One species lays about 1000 eggs that hatch in about a week into "black worms", or "leatherbacks", and develop eventually into pupae that live about a week before transforming to adults. Larvae vary greatly in food and habitat.	Class Hexapoda. Order Diptera. Family Culicidae. <i>Culex</i> eggs, in rafts; <i>Anopheles</i> eggs, laid singly. About 300 <i>Culex</i> eggs per female laid in water; hatch in 1 to 7 days into larval wigglers that live in water 6 to 21 days coming to surface to breathe, and transforming to active pupae, which, in 1 to 6 days, become adults.
BEHAVIOR	Food of larvae almost exclusively aquatic animals caught and held by strong jaws that are able to inflict painful bites on humans. Hold on tenaciously. Protection, largely by position under cover under water. Since the larvae are choice fish food they have many enemies.	Food of adults, nothing; of larvae, a great variety of plant and animal materials, some caught by prowling, some by nets stretched in moving water. Protection largely by means of protective houses, some of which are strong. Houses in moving water commonly of stones; in still water, of easily-moved plant materials.	Food of some adults, flower nectar; of others, nothing. Food of larvae varies, some eating animal matter; others acting as scavengers, and still others are plant eaters. Protection of adults by escape and of larvae by hiding. No aggressive protection of individuals.	Females of many species blood suckers, but males not so. Larvae live on minute organisms in the water and are preyed upon by many aquatic animals such as birds, newts, fishes, water beetles and so on, all of which are useful in this connection. Must come to surface to breathe and so an oil film on water suffocates them since they cannot reach the air.
REACTION TO HEAT AND LIGHT	Adults definitely attracted to lights near streams, and since such insects frighten many people they may be killed unnecessarily.	Adults are attracted to the lights. Larvae sensitive to touch and to light, and able to secrete a unique waterproof silk.	Many adults attracted to light. Many form clouds of dancing individuals at definite times of the day. Larvae of some nocturnal.	Most species active at definite times of the day and sensitive to light, temperature and humidity. Particular mosquito species carry diseases to particular animals.
USE TO MAN AND PLACE IN NATURE	Serve as a check on multiplication of some aquatic animals but help man, particularly as an excellent bait for bass and other game fish.	Valuable food for fishes and interesting aquarium pets. The adults often occur in great flocks whose hairs freed into the wind have been known to cause one kind of hay-fever with some persons.	Make good food for fishes, and larvae make excellent bait. Some larvae destroy meadow plants and injure pastures seriously; can be controlled by poison mash of 1 pound Paris green to 25 pounds of bran with water.	A serious pest in most places. Different species known to carry malaria, yellow fever (below the frost belt), dengue, filariasis and other diseases, and to make regions uninhabitable by man.

MIDGE	BLACK FLY	DIVING BEETLE	WATER-SCAVENGER BEETLES	WHIRLIGIG BEETLES WRITE-MY-NAMES APPLE-SEEDS
Adults, like small mosquitoes but more delicate in abdomen, legs and antennae. Antennae of males, feather-like; of females, only sparsely so. Larvae mostly aquatic; some red—known as blood worms—may remain hidden in a case made of silk and oozes.	Adults, small, short, stout-bodied, humped-backed and short-legged. Males, with eyes continuous; females, with eyes separated widely. Many, black, with broad, iridescent naked wings. Larvae, like worms with a sucker disc at tail end and a fringe at head.	Adults with hard forewings. Usually black and brown. When under water show a bubble at tail end. Hind legs modified for swimming. Females of some species with forewings furrowed. Males of some with discs on forelegs. Larvae aquatic, slender, with large jaws, active and voracious.	Usually black beetles, elliptic, more or less flat beneath and convex above; when in water, show under surface silvery with a film of air. Larvae, stouter than those of Dytiscidae the foreparts being more slender and the jaws less conspicuous.	Relatively flat, oval, blue-black, or black, and brown beetles with forward reaching fore-legs and hind legs adapted for swimming and attached to centers of bodies permitting sudden changes of direction. Larvae, slender, with rather conspicuous abdominal appendages.
Adults commonly fly, often in dancing flocks of great numbers. Larvae mostly in water, but some on land.	Found as adults in air in great numbers in season. Larvae found in water; also the pupae.	Common in ponds and streams but particularly so in standing water.	Most species found in fresh water, although a few live in moist soil or dung.	Swim rapidly in spirals and circles on surface of quiet or rapidly-flowing water.
More than 200 kinds of midges in America, some being found in tide pools as well as in freshwater.	Adirondack black fly, a pest of northeastern states; the buffalo gnat of the Mississippi Valley, and the turkey gnat of the same region, are good representatives.	Some 300 species of North American diving beetles, ranging in length from less than ¼ inch to more than 2 inches. The largest family of water beetles.	Range through North America and elsewhere, there being nearly 200 North American species. Most common eastern species is <i>Hydrophilus obesus</i> , ¾ inch long.	The larger <i>Dineutes</i> has about 13 North American species, and the diminutive <i>Gyrinus</i> has some 26 North American species.
Class Hexapoda. Order Diptera. Family Chironomidae. May mate in air; a female may drop a brown mass of about 700 eggs into water. These may hatch in 3 or 4 days into larvae that may require from a month to 2 months or more to reach pupal stage. Then may swim like wrigglers near water surface for a few days before transforming to adults.	Class Hexapoda. Order Diptera. Family Simuliidae. Mate in air in early summer; lay white or yellowish eggs, which become black on rocks washed by current and develop into larvae that stand erect in rapidly-flowing water, often making black blotches on bottom. Pupate under water for about 5 days.	Class Hexapoda. Order Coleoptera. Family Dytiscidae. After mating, around March or April, females may lay 20 to 50 eggs, singly in slits in plants under water. These hatch in about 3 weeks into larvae, which develop 4 or 5 weeks, changing into pupae, which remain buried in earth from 10 to 20 days in summer or longer in winter.	Class Hexapoda. Order Coleoptera. Family Hydrophilidae. After mating, females may lay about 130 yellow eggs enclosed in water-proof, cocoon-like structures attached to plants near surface or floating. Larvae crawl about under water going through at least 2 moults in a month. In late summer, for about 12 days, pass pupal stage in soil.	Class Hexapoda. Order Coleoptera. Family Gyrinidae. May fly from pond to pond. After mating, females lay 1 to many white, cylindrical eggs on submerged plants. These hatch into fierce-looking, slender, flattened, light-colored larvae that finally leave water, spin gray, paper-like cocoons in which a month is spent before transforming.
Food of adults of some species, such as punkies, blood, but of most species this is not the case. Larvae may feed on minute plants or animals of the environment. Some few larvae infest living plant material. Some eat the cases that they make of pond-ooze material.	Food of adult female Adirondack black fly, blood; also of the southern buffalo gnat and the turkey gnat. Males, and the white-stockinged black fly, and others, may be harmless, living on plant juices. Protection by numbers, by inaccessibility of region where larval stage is spent, and by escape.	Food of larvae and of adults, animal matter captured in jaws and sucked into the mouth. Young larvae feed by sucking, even attacking and killing their own kind. In captivity, may be fed on raw beef or on a mixture of cereal, powdered shrimp and ant "eggs" ground together. May destroy fish and fish eggs.	Food of adults, largely decaying vegetation, but some feed on other small animals that may be captured alive. Larvae feed on small animals, frequently sucking through hollow jaws. Adults may fly from pond to pond, often being attracted by lights and falling helplessly to ground. Have a number of parasites.	Food of young and of adults, probably solely animal matter, usually captured at water-surface alive. In captivity, may be fed raw beef on toothpicks left afloat; not known to feed below the surface. Protection by escape, and in some species possibly by offensive, apple-seed odor given off when captured.
Activities of some definitely associated with light as they may all become active at once, usually late in the day, when they may cause a hum of buzzing wings.	Require well-aerated water. See by night with upper halves of the eyes and by day with the lower halves. Must have well developed sense of locating food.	Adults fly from pond to pond; may be attracted by light. Air held under the hard forewings enters through openings on top of abdomen; expelled at surface when stale.	Air taken at surface by extending antennae and folding them back over a bubble of air that is carried beneath and spread over under surface.	Apparently have four eyes, two looking upward and two down, but experiments show that the lower pair do not function and they are but a part of the whole eye.
Some, woodland pests in season, but most in their immature stages are valuable forms of fish food, forming the major diet of many species that are valuable to man.	Some, about the worst insect pests of the woods in early summer, attacking cattle and other domestic animals. All may supply, as larvae, useful food to fishes able to get them. One common species is never known to bite.	Unquestionable enemies of fish and other forms of water life but may themselves serve as fish food. Probably serve as useful checks on multiplication of such animals as mosquitoes and their larvae.	Food for some fishes; scavengers of waste materials; kept in control by unfavorable climatic conditions and by parasites. Larvae eat any animals available in aquaria. Pests in fish hatcheries.	Most interesting scavengers of the water-surface with an abundance of common names indicating that they have attracted general attention. Not known to do any particular harm and might well figure in mosquito control.



BETTER AND THEIR LARVAE. LEFT TO RIGHT: WHIRLIGIG BEETLE, DIVING BEETLE AND THE WATER SCAVENGER BEETLE, WITH, BELOW, THE HALIPLID BEETLE.

(Continued from page 479)

black flies illustrate this very well. Some of them have discs in rows along the under side. Some have discs at one end, and most of them supplement these with a silken attachment that serves as a life-line when the discs fail to work.

The food problem is a relatively simple one to an animal that can remain anchored in a swiftly-flowing stream. The food comes by and has only to be caught and held. Ingenious nets are spun by some swift-water caddisflies to catch their food. Rakes and scrapers are a part of the equipment of other insects of swift streams. All of these are worth looking for in any brook.

Acknowledgment and References

This article is modified from a similar article by the author published in the *Cornell Rural School Leaflet*. The modification is made with the permission of the New York State College of Agriculture at Cornell University. The illustrations are by Velma Knox Mayo and are copyrighted. The more useful supplementary books dealing with this group follow:

Life of Inland Waters, by James G. Needham and J. T. Lloyd; Comstock Publishing Company, Ithaca, New York, 1930.

A Guide to the Study of Fresh-water Biology, by James G. Needham and Paul R. Needham; Charles C. Thomas, Springfield, Illinois, 1930.

A Handbook of the Dragonflies of North America, by James G. Needham and Hortense Butler Heywood; Charles C. Thomas, Springfield, Illinois, 1929.

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Culture Methods for Invertebrate Animals, by James G. Needham et al.; Comstock Publishing Company, Ithaca, New York, 1937.

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George Chandler Whipple; John Wiley and Sons, New York City, 1918.
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Economic Significance of Aquatic Insects

The economics of insects of our waterways is generally not thoroughly appreciated. True, most people have heard of the relationship between mosquitoes and malaria, and have understood that by managing the life of ponds in which the mosquitoes breed adjacent territory has been made habitable by man. It seems hard to think of our modern civilization functioning in Cuba, the Philippines, the Canal Zone without our being able to control some of the diseases that formerly raged through these regions. Not so well advertised as malaria is the relationship between aquatic insects and some of the parasitic worms that live on our domestic cattle, and of the relationship between insects and the organism that causes elephantiasis, which is purported to affect forty percent of the natives of the South Sea Islands.

There are, however, more pleasant aspects of the relationship between water insects and man's interests. Without these insects great numbers of our food and game fishes would not be able to reach maturity. The capture of these fishes provides pleasure and employment for a considerable number of persons. The consumption of their flesh in one form or another is an experience shared by all.

The most interesting problems in this whole field hinge around the development of management practices whereby these insects may be made to use a maximum of waste materials in waterways for the production of a food valuable to species of fishes of economic importance. For example it is now known that the wastes of milk plants can if properly distributed be made to produce a maximum of insect food, which in turn will support an abnormally large fish population in a given amount of water. The solution of difficulties associated with waste disposal by such means as this is of great importance as an adjunct to necessary restrictive laws seeking to check pollution. It is but one phase of the whole modern field of management of wild areas, which holds public interest at the present.



the waters close to land. Here, too, we find moods when water and wind conspire to reveal beauty and power. There is rare beauty in a stiff, off-shore breeze that sends the breakers scurrying back to shore, tossing high their foaming crests, sending spume rioting into every rock crevice to eddy and subside. There is true loveliness in the orderly breaking of the waves as they reach their crests and spill their hidden whiteness before them.

There is a thrill, born, perhaps, most of awe, in a storm at the seashore. Braced against the wind that tears at the branches of the trees, shrieking, one finds that there is salt in the very air. The black horizon meets with angry foam, and the landsman counts it well to have solid earth beneath his heels. Wind and sea join in roar and rack, and give man cause to think of his littleness and impotence against such as they.

And when the storm has blown itself tired, and the sea is left with no more than a restive memory of the bout, the evening sun glows across the gentle ripples, the lapping tongues of breakers. The moon rises to lay a silver sword across the waters.





Hidden Valley of the Joshua Tree National Monument

By WALTER FORD

By recent presidential proclamation, 825,340 acres of California desert land, once the domain of warlike Indian tribes, was set aside as the Joshua Tree National Monument, to be administered by the National Park Service. Included within its boundaries are wind-swept sand dunes, forests of the giant yuccas known as Joshua trees, and fantastic rock formations. Combined, these offer the visitor a variety of desert scenery unequalled elsewhere in the West.

Between the slopes of the Little San Bernardino Mountains, which parallel the western boundary of the area, and the Pinto Mountains to the east, lies a region that bids fair to become the most popular section of the whole Monument. Here is a granite-strewn region in which Nature has allowed the forces of erosion full sway. The resulting life-like figures carved by the elements are tributes to her generosity. Stone faces, animals, creatures of the sea, combine in a display that is truly fantastic.

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In case the reader's imagination is not as active as the author's, we would point out, reading from top to bottom on this page, at left: The Stone Bull, from which a fine view is afforded; Fish Rock, somewhat out of place in a desert; The Trojan, a life-like formation near the entrance to Hidden Valley.

Seeming ever loath to reveal her secrets, Nature has concealed the most bizarre formations in a section that has appropriately been named "Hidden Valley". The only entry to this treasure spot is through a narrow opening beneath a mass of granite boulders. As one approaches the entrance the figures of a huge bird and the head of an elephant rise against the sky line, as though to bar admission to the strange region that lies beyond.

After crawling for a distance of about twenty-five feet through the narrow entrance, the visitor finds himself in a shallow valley containing approximately fifty acres. This is completely surrounded by perpendicular walls and piles of granite. Of the countless formations within the valley, some of the most realistic and easiest to see are those that loom against the sky along the valley walls. Prominent among these is the "Trojan", so named because of his resemblance to a warrior of ancient Troy. This stern-faced fellow appears near the entrance and is the first formation to meet the eye of the visitor.

One of the most realistic carvings of Nature to be found in the basin is the stone bull resting on a stratified throne on one of the highest points overlooking the valley. It stands like the sacrificial shrine of an ancient race. Close inspection reveals a perfectly proportioned figure. It also provides a vantage point for a magnificent view of the whole region. From here numerous formations that are not visible from the floor of the valley come into view. Among these is "Sleeping Simon", a grotesque figure that appears to be napping under the desert sun.

The author discovered Hidden Valley several years ago and has made numerous visits to the area since that time, each one resulting in the discovery of some new natural wonder. Prior to its inclusion in the Joshua Tree National Monument, the location of Hidden Valley was known to few.



From top to bottom on this page we have views of a portion of Hidden Valley as seen from The Stone Bull; Skull Rock, one of the many weird formations found here; Sleeping Simon, who appears to be sunning himself.





Bitterns in the Bulrushes

Photographs from C. Anders

Always fascinating is the study of the ways in which Nature has provided many members of her numerous family with means of self-protection. These may take the form of color, similarity to some other form, or some instinctive act.

Here we see the dwarf bittern of Europe, *Ixobrychus minutus*, and her family. It is cousin to our least bittern and its life habits are similar. Its usual nesting place is near water and among rushes or other tall-growing plants. It makes a nest from materials found in the vicinity, thus camouflaging its home even before starting to rear a family.

Here we find the parent bird on her nest with the rising generation already hatched. Something, probably the photographer, has alarmed the mother. She straightens up, narrowing herself almost to reed size, freezing straight and still and blending into the tall, straight growth around her. When she takes this pose it needs a sharp eye to discover the nest and its contents.

The same instinct seems to be born in the youngsters. They, too, try to turn themselves into upstanding vegetation, but their downy grayish-white plumage is less successful as camouflage than the feathers of the parents.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.



THE WATERFOWL SEASON ★ ★ ★

dy and bufflehead ducks to the shootable list, and the right to have in possession two days' bag limit is what migratory waterfowl face this season. This represents an increase of fifteen days in the season, allows shooting of three ducks a day of those species protected last year—and ten of other species of ducks and geese—and doubles the possession limit.

These regulations were presented to a meeting of fish and game commissioners by Ira N. Gabrielson, Chief of the Bureau of Biological Survey, and were accepted by them. It seems apparent from the Bureau's press releases that this year's waterfowl hunting rules represent the best that Mr. Gabrielson felt he could propose and still get cooperation in enforcement from state authorities. Last season the migratory waterfowl got a "break" by virtue of a mild and late fall, and many hunters got no shooting. There was widespread protest from the nimrods, with Mr. Gabrielson bearing the brunt. There is no doubt that the new regulations are fairer to the hunters, if not to the ducks.

As far back as last winter the way was being paved for this year's regulations. Reports were given out recording a substantial increase in birds during 1937, due to better conditions in the breeding areas and less kill during the 1937 season. These reports have been bolstered by claims of added increases in the 1938 breeding season. No doubt there have been increases, but they do not mean, by any means, that our migratory waterfowl population has been "brought back". Nor has there been any evidence presented to justify a fifty per cent increase in the length of the season, a lifting of the ban on the species hitherto protected, and doubling the possession limit. Such a liberalization portends an increase in the kill so great that we fail to see how the result can be other than disastrous. The

Forty-five days of shooting, restoration of redhead, canvasback, ruddy

severe restrictions lately in force have been predicated on the necessity of sending more birds back to the breeding grounds. It seems to us inevitable that these birds are now to be killed instead of being saved for breeding stock.

For these and other reasons we regret that expediency demanded of those vested with the responsibility of administering this resource a lengthening of the season. Nor are we inclined to agree with some that the two-day possession limit is innocuous and merely a sop to the more affluent hunters able to travel a distance and spend more time at their sport. We believe that this new wrinkle in the regulations permits a lot of skulduggery, and that it will be extensively taken advantage of at the expense of the ducks. Furthermore, it is interesting to note that when this was proposed in a bill before Congress a few weeks ago, Mr. Gabrielson opposed it.

We do not believe that the endangered species, protected last year, have increased enough to permit shooting, even at the rate of three a day per duck hunter. At the same time we realize that many of these species were shot last season and not collected because of the protection given them. However, we are unable to see how a small bag limit is going to help them any, and the protection might at least operate to teach some duck hunters the difference between the species.

We cannot share the hopes of the Bureau that even the concessions now granted will result in better cooperation from the States. Our experience precludes the hope that any real cooperation can come from officials who consistently oppose reasonable restrictions intended only to protect a resource that is produced beyond their borders, but who consistently strive for privileges that, if granted, would destroy forever the bounty on which they depend. The prominence given to certain trivial instances of cooperation goes far to prove that cooperation by certain of the States is more the exception than the rule, and is, indeed, a slender reed.

Conservationists may take some solace from the reten-

tion of the ban of baiting, and on the use of live decoys and other means of wholesale slaughter. We may also be happy that the More Game Birds in America group failed in the demand for a staggered season. Even with these vital restrictions in force, and with the prospect of better cooperation in enforcement, we await the 1938 season with continued concern—a concern that prompted us to urge a series of closed seasons so that a *real* job of waterfowl restoration might be accomplished.

LET'S FINISH THE QUETICO- SUPERIOR JOB

For twelve years now conservationists and public-spirited citizens with vision for the future have been striving for the preservation of a

great international outdoor playground known as the Quetico-Superior project. During that same period the plan has been fought by selfish special interests concerned with timber and power and with no concern for posterity. They have used all kinds of tactics—obstruction, political pull, false propaganda. It is time to put an end to this and to move directly to the goal now in sight.

The area involved is a glorious lakeland wilderness included in the Pigeon River and Rainy Lake watersheds of northern Minnesota and adjacent portions of Ontario. The battle for Quetico's preservation has been carried on through the Quetico-Superior Council in association with the Izaak Walton League of America and many other groups. Most recently a special committee appointed in 1934 by the President of the United States has studied the question exhaustively and recommends the immediate completion of the project.

Once achieved, the area to be included would comprise about ten million acres of splendid wilderness, lakes and streams. Substantial acreage is now in public ownership on the Minnesota side through the Superior National Forest and the Grand Portage Indian Reservation, under which jurisdictions the land would remain. What needs to be done by the United States to attain immediate effective control is to acquire purchasable land at a cost of about \$1,250,000, this to be added to National Forest acreage. Allotment from emergency funds—or special appropriation from Congress—is amply justified and would be economically wise.

Continuation of private ownership of these lands means ill-advised road building and destructive exploitation through dam-building and timber slashing. The threatened damage must be prevented by action and without delay. Furthermore, effective control is important to facilitate treaty negotiations with Canada to attain the international objectives of the project.

Misrepresentations by selfish opposition notwithstanding, the program merely seeks agreement between Canada and the United States—*without changing jurisdiction or administration on either side*—for the wise control of this

area. All waters, shores and other natural features would be preserved in a state of Nature; forests would be administered on a sustained yield basis; game, fish and furbearers would be managed for maximum natural production; an international committee of trained individuals would serve to coordinate practices.

There is no reasonable grounds for opposition to this project save those that arise from selfishness and a desire to exploit one of our few remaining areas of wilderness beauty and value. There is every reason to support this project and to aid it in moving quickly to its consummation.

We are proud of our northern boundary that bristles with no bayonets and concrete gun emplacements. In the state of the world today, we can think of nothing finer than two great countries joining hands to set aside a splendid area in which Peace and Nature reign as king and queen.

DAMS AND ★ DESTRUCTION

It is an amusing experience to mingle with the members of a chamber of commerce and hear their dire predictions for the future; their demands that Federal expenditures be curtailed and the budget be balanced; their wails about taxes. And then it is equally amusing to hear those same gentlemen, a few minutes later, vociferously and unanimously adopt a resolution demanding—demanding, mind you—that the Federal Government spend umpteen million dollars to build a great dam and irrigation project nearby so that a lot of power that isn't needed can be produced, and a lot of land that isn't needed may be made available to debt-laden farmers.

When one stops to think, all this sounds silly, yet it is a form of mental gymnastics that is going on in specific cases in many parts of the country these days. No finer case in point is to be found than the hysterical eagerness of the organized businessmen of western Oregon to get more millions spent for dams and inland waterway and irrigation projects on the Columbia, Willamette and Snake Rivers. At the moment great pressure is being brought to bear for a series of high dams on the Willamette, and another dam at Umatilla Rapids on the Columbia. The total cost would run close to a hundred million dollars.

The sad part of projects of this sort is that the surveys upon which they are based are concerned only with the feasibility of the construction. Little or no attention is paid to what resources may be destroyed in the process, and hardly more attention is given to the real need of the projects themselves.

On the destruction side, the Columbia and Willamette dams mean the eventual destruction of the salmon industry. This industry, producing an annual income of ten million dollars, may be conservatively described as a two hundred million dollar business. It supports thousands of families and keeps them off (Continued on page 505)

The Real Cougar

By W. B. CONGER

ONE REASON, among several, that the cougar is feared by the uninformed is that it is misnamed a lion. The real lion is a cat. The cougar is a cat, but the cougar is not a lion. Another reason is its size. A third cause is the effect of the yarns of those who desire to give the impression that this creature is a four-footed fury, and thereby enhance their own reputations as hunters. Finally, there is the misrepresentation of this animal to the public by organizations that profit by its destruction.

Of the large animals of this country, the cougar is undoubtedly the most maligned. Those who have studied it tell us it is naturally of a mild and playful disposition when not goaded by hunger, fear or danger to its young. They tell us, too, that the cougar is always at heart a kitten, and that, with the exception of some monkeys, it is one of the most playful animals in the world. Grown cougars placed in captivity pine and die, but the young make affectionate and playful pets, purring with pleasure at the approach of a human being, stranger or friend, and begging to be caressed. Those who have raised them as pets testify to this mildness of disposition, affection, and lack of temper.

In the early history of this country, when cougars were plentiful, children went to school through fields and forests unharmed and unalarmed. Those who have come in contact with this animal in its natural home, minus the desire to shed its blood, have found it not ferocious but friendly. Through all the centuries the cougar was untroubled by the North American Indian. It had no fear of squaw or brave; it harmed no papoose, nor did the

*America's great wild cat
has been the victim of
misinformation and
many false tales*



Indian, in turn, have any dread of it. The Gauchos of the Pampas called it "Amigo del cristiano"—man's friend. It has always lived in peace. It does not naturally run from members of the human race, but learns to do so when continuously persecuted. It has learned it has no chance against the man armed with a high-powered gun, who can shoot from a safe distance. It hates and dreads the yap of the small dog, or the uncanny wail of the hound, the forerunner of its doom, the heralds of a band of armed men. No protection has ever been given the cougar, although its young remain more or less helpless for from six months to a year. It is not a prolific animal, and the years of none of the members of the feline

tribe are many, so its survival is none too certain.

A hunter, thrown from his horse early in a hunt, had his leg broken. As he lay helpless he saw a cougar moving about, in fact, the animal sat down near him, yet showed signs of restlessness, going and returning as if he feared the approach of an enemy. This man appears to have been unafraid of the cougar, although he felt some concern when he heard the roar of a jaguar, and became aware that the two great cats were fighting. The fight was renewed from time to time during the night; in the morning both animals had disappeared. On occasion another hunter who had a cherished reputation became, through a misadventure during a hunt, the butt of his friends' jests. Chagrined, he went in search of something to kill. He tried to knife a cougar sitting quietly by the wayside. The animal avoided him by a quick movement, gave his assailant one tap with his paw, then

looking for a few seconds at his discomfited enemy, trotted quietly away. It appears that the cougar does not attack a fallen man, a chivalry never shown him in his extremity.

No form of life was placed here to be snuffed out through indifference, or because of any whim or form of vanity, whether masculine or feminine, or from greed.

The cougar's natural and legitimate food is the flesh of the large and wild mammals, but it eats also many small creatures, even down to frogs and grasshoppers. As a pet it will eat anything offered it. Its favorite prey is some form of the deer tribe, in fact the original continental ranges of cougar and deer were practically

the same. But the beauty so apparent to the conservationist-to-kill in the closed season becomes dull to his eyes during the open, and the cougar's natural food is begrudged him. When the animal's natural food supply has been thinned out by that unlovely trilogy—gunners, trappers and poisoners—it may attack unprotected cattle, sheep and colts, and thereby come into collision with the bank account. The cougar is a good sportsman, killing only what he needs, usually hunting alone or with his mate, returning to his cache for a second, sometimes for a third visit. What remains falls to the smaller carnivores of the woods. Of course, there are rogue cougars, just as there are rogue coyotes, rogue elephants, rogue sportsmen and rogue politicians. The rogue of any species enjoys only slaughter and persecution of the weaker, wasting large numbers by unbridled callousness and deliberately destroying what he cannot replace.

There are less than a dozen authentic accounts of attacks on human beings by our great cat, and of these several cannot be truthfully termed attacks. These few instances occurred in the West, from British Columbia to California.

In one instance, termed an "attack," two young cougars asleep near a log in Idaho were seized by a cubnapper. Abruptly awakened, they cried aloud. Both parents came hurrying to the rescue. In the ensuing fight, the thief, although assisted by a companion, was badly hurt, and both parents of the kittens were killed. The pair of cougar youngsters thus captured probably spent the remainder of their unfortunate lives in captivity in a zoo.



A COUGAR SURVEYS THE SCENE BELOW

Because of its size many regard the cougar as a most dangerous animal, which its record disproves

The following instance, which occurred in 1933, illustrates the friendly instinct of this quadruped:

"Lydia Ann Atkins, then about eight years old, had been sent to drive up the cows. Lydia was accompanied and assisted by a big yellow dog. The cattle were not unduly frightened, and if a cow loitered, the 'big dog' trotted out toward her and she joined the herd in a hurry. 'Panther,' shouted Father Atkins. 'Run.' The panther stopped and sat down on his haunches, looking at them benevolently. He turned and walked slowly away."

According to Lydia Ann this was not the first time the "big dog" had assisted her in driv-

ing up the stock, always stopping when he came to the bars.

In January, 1936, a cougar, somewhat out of his home boundaries, had full opportunity to kill a policeman on his beat in the suburb of a western city, but true to his friendly nature, the wild animal did not harm the guardian of the peace.

The last known instance occurred in September of the same year. A California deer hunter in camp states that his slumbers were disturbed throughout the night, the first time by something blowing in his face. "I brushed that off. Then something nudged me as if trying to share my blankets. I cuffed that off." In the morning he saw his tent floor decorated with paw prints "as big as hams." This man resigned his new position in the Forest Service as he said he could find gentler playmates than mountain lions. We wonder if he could.

It would be interesting to know the percentage of domestic stock killed each year by the cougar; from freezing; from starvation. It would be interesting to know why American ingenuity, which has heretofore not acknowledged defeat, has fallen flat in the protection of domestic animals.

It seems proper to suggest that the stock owner be not allowed to overbuy; that he should pay for the protection and provision of his own livestock and not expect the United States Government to do it for him; that he should not be allowed the "privilege" of using poison or traps; that no animal should be killed unless it is actually attacking livestock, and, thus, a known offender.

Things to Think About

"It may not be the business of anybody outside the United States to express himself on the proposed engineering and water diversion project in the heart of the World's oldest national park. However, in a way, the wonderland of Yellowstone belongs to the World," writes Dr. L. C. Romell, secretary of the Swedish Government Committee on Planning and Recreation, in a letter to Secretary of the Interior Ickes.

Dr. Romell warned that "if commercial interests should be allowed to encroach upon Yellowstone Lake it would mean far more than despoliation," and would be a "terrific blow to the entire national park idea which could not fail to have its repercussions throughout the world."

In reply Mr. Ickes said:

"It is gratifying to hear from you that Yellowstone National Park is taken as the international model for all national parks. It will be my endeavor to keep it so by opposing the present irrigation project and all proposals tending to break down the integrity of our national park standards. The enjoyment of its magnificent natural wonders is not limited to Americans. Last year alone some 6400 visitors from 37 foreign countries visited the park."

Recalling that Congress, in establishing the park in 1872, made it the duty of the Secretary of the Interior to provide "for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in the natural condition," Mr. Ickes said:

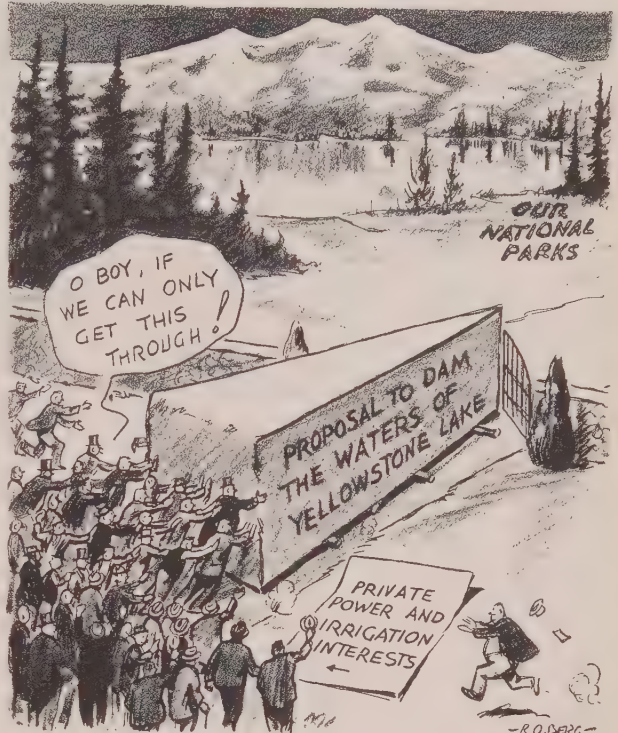
"Like my predecessors I insist that this condition is indispensable if the Yellowstone National Park is to continue to fulfill the purpose for which it was established."

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Figures for duck stamp sales for the 1937-1938 year totalled \$757,000 and established a "new high", according to announcement from the United States Bureau of Biological Survey. Stamps for the 1938-1939 year are, of course, now on sale, and in view of the announced season designed to be more attractive to the hunters—if not to the ducks—a higher sale may be expected.

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American Magazine runs a department called "Interesting People", using a picture and brief caption. In August it publicized a Syracuse fireman who drives the rear end of a hook and ladder. His claim to fame appears to be—quoting the magazine—a suggestion that "instead of charging money for junior memberships in their local hunting club, let the juniors pay their annual fees in predators—5 crows, 2 hawks, one great horned owl, or whatever animals prey most upon the local game." Again quoting the magazine's caption, "the idea spread like buckshot, and clubs from Oklahoma to Saskatchewan have taken it up." Publicity and misinformation like this is discouraging just when intelligent sportsmen have



THE ENTERING WEDGE

come to realize that hawk and owl extermination campaigns are not only absurd but dangerous.

• • •

Confronted with an overabundance of deer and a large excess of does, the Pennsylvania Game Commission has, after careful study, declared an open season on antlerless deer from November 28 to December 3. Antlered bucks are protected. Food supply has become a problem, and the sex ratio has been upset, while the large number of deer constitute a problem to farmers and landowners in many sections. The day and season bag limit is one deer.

• • •

A revised edition of the conservation teaching unit on *Fish-Eating Birds* has been brought out by the Emergency Conservation Committee, 734 Lexington Avenue, N. Y. Additional material makes it more adaptable to school use and more provocative of further study.

• • •

Announcement of a "game management area" at Taylorsville dam in Ohio brought an attack on "vermin" from Mr. McGee, outdoor writer for the *Dayton Journal*. It also brought an answer from Ben J. Blincoe of Dayton, who has a real background of outdoor knowledge and an ability to express it, as witness:

The crow seems to be the sportsman's public enemy No. 1. The long train of crows against the winter sky always delight the writer, and the roost at Taylorsville dam is one of long standing.

Many motorists stop to watch the great flights of these birds as they come to roost. Probably it has not occurred to the sports writer that many people derive great pleasure from merely observing this phenomenon.

The red fox is found here, but certainly the region is not "over-run" with them. On one of my red-letter days in the Taylorsville bottoms I discovered a red fox watching several titmice and juncos. I was counting birds for the Audubon census—the red fox apparently counting on a dinner that did not materialize. The sight was an outdoor pleasure that could not be duplicated if the fox were exterminated. A wild life region without the fox is incomplete.

"Hawks and weasels are plentiful all over the place," according to Mr. McGee. I am not quite sure that he is well posted on hawk identification when he makes this statement in regard to hawks. On one occasion I saw four hawks of as many species and at another time three red tails. During nearly any winter day one or two hawks may be seen there, but I have often been disappointed in finding none. As for weasel, I have no doubt he is a resident of the region and look forward to the day I may find his trail in the snow.

Is there real evidence that the predatory species of birds and mammals make serious inroads on other forms of wild life at Taylorsville dam? I believe not. For ten years I have visited the area on the 26th of December, taking a bird census. Each year I see, incidentally, from three to 10 rabbits, several pheasants, 50 to 500 waterfowl and an occasional fox squirrel in addition to a large number of non-game birds. On the same date over the same number of years I have tramped the Englewood dam area. Here I find no rabbits, no pheasants, few or no waterfowl, and smaller numbers of non-game birds.

Why this great contrast in the abundance of wild life? I believe shooting is the responsible factor as hunting has not been curtailed at Englewood dam.

When the National Park Service began its co-operative work with the Miami conservancy district it was the writer's fondest hope that the wild life policy of the National Park Service might be applied to the Miami conservancy areas. Particularly is the educational feature of the Park Service desirable, for with competent field naturalists to point the many interesting forms of plant and animal life in our conservancy parks, local outdoor enthusiasts would derive greater pleasure in visiting these inviting areas.

The Ohio division of conservation in the past has been decidedly hostile to all predatory wild life. Its game management

plan is not a general wild life plan but one that favors a few game species at the expense of non-game species equally interesting to the nature lover. It is proposed, eventually, to allow hunting in the Taylorsville park which will doubtless modify its wild life.

• • •

Forty-one thousand acres of the large water reservoir above the Wheeler dam in northern Alabama have been set aside to form the latest addition to the Federal system of migratory waterfowl refuges. It will be known as the Wheeler Migratory Waterfowl Refuge. It was estimated that more than a half million wild ducks stopped there during the spring migration of 1937 and following permanent impounding of the water. Food and cover plants will be established in the shallow water areas.

• • •

Illegal trapping of ducks can be an expensive venture. as C. G. Adams of Wenona, Maryland, now knows following imposition of a fine of \$500 in Federal court in Baltimore. Under the Migratory Bird Treaty Act the buyer of migratory waterfowl is also guilty. It is the demand for these bootlegged birds, originating with "our better citizens", patrons of certain clubs and restaurants, that makes men in the duck country take the chance.

• • •

An area in Pamlico Sound adjacent to the Pea Island Migratory Waterfowl Refuge off the North Carolina coast has been closed to shooting by proclamation of the President. Large numbers of diving ducks, Canada geese and other waterfowl, as well as shore birds, winter at Pea Island, and protection of the shallows in the Sound between the refuge and the mainland is important to the successful administration of the wintering ground.

Of course we do not pretend to say that no red-tails came north in 1937, as we saw quite a few in other parts of our Province, but the gradual decrease in the figures is very disturbing. My residence is at the point where the counts are taken, and on days I could not take it I engaged a capable young man to keep the records.

On April 4, 1938, he wrote as follows: "I think the red-tail flight is over. Not a bird has passed my viewpoint, although in five trips west of the city I have counted twenty-three birds." Writing again in mid-May, he says: "Not one red-tail passed my place this year."

Numbers of red-tailed hawks observed in Red River Valley near Winnipeg, Manitoba. Notes taken each year at the same spot.

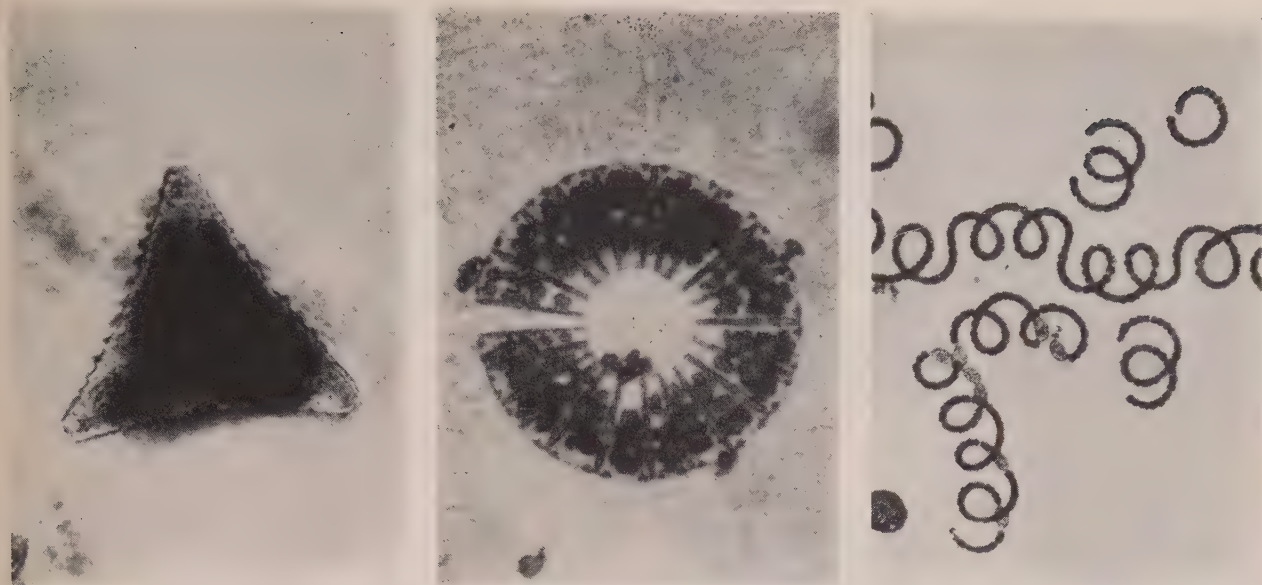
April	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
1930	0	11	0	10	93	87	300	838	60	38	47	1	0	0	1485
1931	0	6	135	220	118	44	344	219	18	10	2	0	0	3	1119
1932	0	0	0	0	0	0	3	146	322	231	6	0	0	6	714
1934	0	15	1	2	5	1	278	250	0	2	1	12	6	0	573
1935	6	1	4	2	0	0	14	9	29	0	0	2	30	12	109
1936	0	0	0	0	0	0	4	0	7	1	0	2	0	0	14
1937	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The Red-Tailed Hawk In Manitoba

IN A letter lately received from Mr. C. L. Broley of Winnipeg, Manitoba, he expresses himself as follows:

I am much concerned about our hawks. I need only refer you to the enclosed seven years' census [printed below] I have taken of the spring migration of red-tails, made at a given point each year on the Red River right at the south end of Winnipeg. There is another flyway twenty-five miles west of the river. This is a stretch of trees that the hawks also follow, and of course it is quite possible that some of my red-tails have swung over to this route. But the river is always a favorite path for these birds and the rapid decrease indicated by my census is very alarming. This year our spring has been three weeks ahead of the usual date, in fact we have had a very remarkable March for Manitoba, and yesterday I noticed a few red-tails twenty-five miles west of Winnipeg. The red-tail migration is two weeks ahead of schedule, but so far no birds have passed my observation point on the Red River.

Each fall we used to see from two hundred and fifty to three hundred rough-legged hawks on migration, but last fall we saw only four and I was in the field a great deal. This spring I have seen only six.



SOME OF THE MICROSCOPIC DWELLERS IN RESERVOIR WATER

Left to right, we have *Staurostrum*, a common desmid; *Meridion*, a beautiful, diatom-like form; *Anabaena*, which gives the water a grassy or moldy odor and is difficult to remove

WHAT'S IN THE RESERVOIR

How the chemist fights microscopic invaders of a city water system

By WALTER E. BURTON

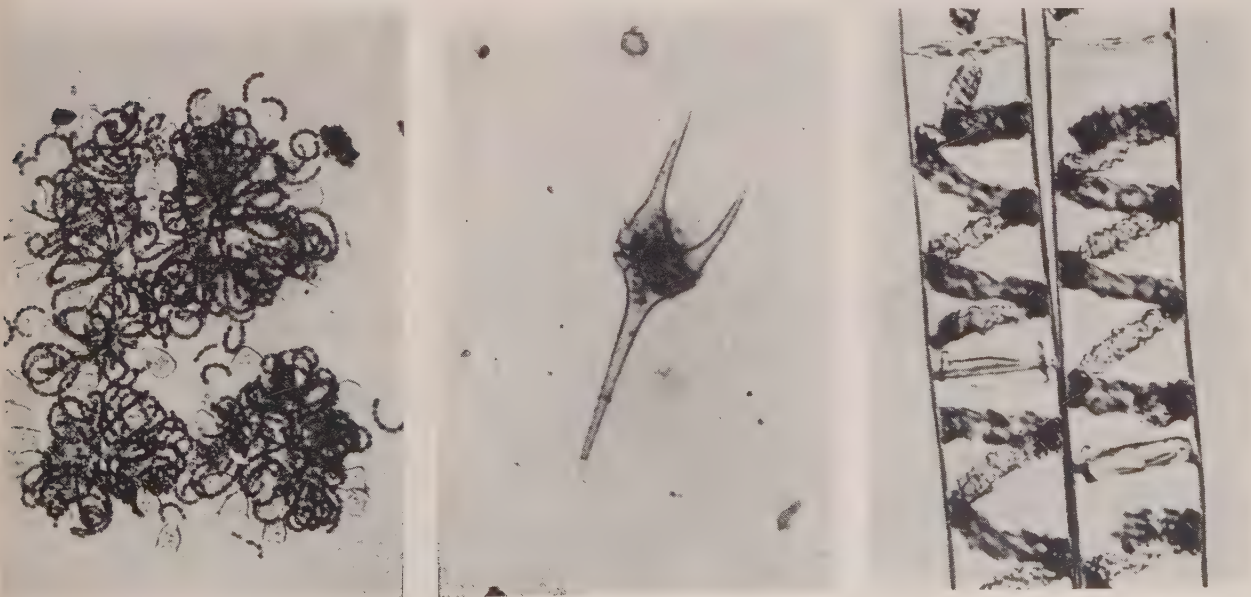
SUPPLYING pure, good-tasting water to a modern city has its ups and downs; and one of the biggest "downs" is the sudden appearance of a smell or taste suggesting moldy basements, cucumbers, pig-pens or fishes that have been dead a long time. When the consumers set up a howl about one or more of these undesirable odors or flavors, the trouble shooters at the water works go hunting, armed with a microscope. Such smells

and tastes in the water of a city system usually are traceable to the presence of tiny organisms called algae.

Algae are the simplest and most ancient forms of plant life. There are an unknown number of varieties in both salt and fresh water. Seaweeds and their relatives all belong to the clan. Every swamp, stream, lake, or stagnant puddle contains algae in abundance. The same holds true, unfortunately, for most city water reservoirs. The plants

MORE RESERVOIR DWELLERS SEEN THROUGH THE MICROSCOPE

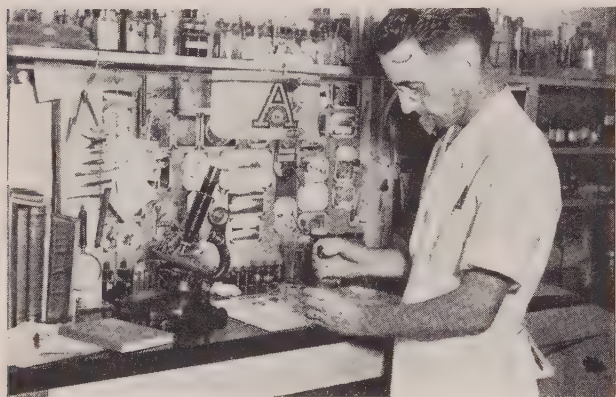
First a drama in the water, an army of *Vorticella* feeding on the bead-like cells of *Cylindrospermum*; then *Ceratium*, odd-shaped protozoan form; finally the familiar *Spirogyra*, usually abundant





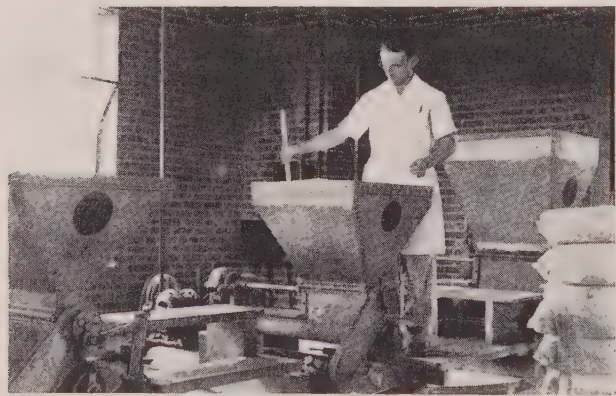
A TRAP FOR THE ALGAE

The chemist filters some reservoir water through a pellet of sand to catch the unwanted residents in the water and prepare an attack upon them



PREPARING FOR A LOOK

A microscope slide of the invaders trapped by the sand is made for study of these tiny forms of life. Photographs are then made of them



NO, THIS IS NOT A BAKERY

Activated carbon, lime and alum are being mixed to be added to the city water as a part of the treatment prescribed for removing the algae

usually are green or blue-green in color, and contain chlorophyll used in manufacturing their food. Sometimes there is a question whether a certain troublemaker in city water ought to be called an alga or a protozoan or something else; but most of them are listed under the first term.

These tiny organisms cause no trouble in drinking water as long as they are of the types that behave themselves. They are removed during filtration and other purification processes, so that the consumer gets algae-

free water from his faucet. The algae, however, seem to live up to the tradition that there always is a smart aleck or two in a crowd; and so the placid atmosphere of a city water-works is likely to be upset suddenly by the appearance of algae that make nuisances of themselves by manufacturing oils or other substances that would make a skunk turn verdant with envy. They discharge these smelly fluids into the water, giving it an unholy odor and an equally bad taste. Sometimes efforts to rid the water of the pests only make matters worse because the dead organisms decay and generate other obnoxious substances.

Nearly every city water system that draws its supply from surface reservoirs must be guarded constantly against sudden invasions of such algae and their near relatives. The city of Barberton, Ohio, however, believes that it can claim some sort of championship in the matter of tastes and odors. It is believed that the problem is worse there than in any other city in the country, although this statement may be challenged, because every water-works superintendent or chemist who has to tackle an alga army soon comes to the conclusion that nothing could possibly be worse than the situation that faces him.

The abundance of bad tastes and odors in Barberton's water reservoir results from the fact that the twenty-eight square miles of watershed that supplies the reservoir is more than half swampland—bottomless beds of muck that were laid down during the glacial age. Such swamps are just about the best places in the world for the abundant growth of microscopic plants and animals, both good and bad.

F. L. Rollins, chief chemist, and C. A. Snyder, his assistant at the Barberton water station, have trapped close to a hundred different species of algae with their microscopes. They have found a number of specimens that have, so far, defied identification.

The algae usually are captured by passing untreated water from the reservoir conduit through a filter that consists of a pellet of silica sand held in a glass container. Occasionally specimens are dipped directly from the reservoir. This reservoir, incidentally, is a dammed-up creek.

Although the checking of city water for presence of bacteria, algae and other things is part of the routine job of the chemists, Mr. Snyder has carried on his algae studies with the fervor of a hobbyist. He has tied the work in with another hobby, photography. He built, largely from scrap material, a photomicrographic outfit with which he has produced algae photographs that have received praise from a number of authorities and universities. Some of his photomicrographs are to be used in a forthcoming textbook on biology.

Mr. Snyder's photomicrographic camera was built by attaching, to the back of a small camera from which the lens had been removed, a box-like extension consisting of two sections, one sliding inside the other. This sliding arrangement permits adjustment of the magnification by varying the distance between microscope and sensitive film. A standard microscope, with ordinary achromatic

lenses, is used. The illuminating system includes a No. 2 photoflood lamp in a toy motion picture projector lamp house. The original condensing and projecting lenses are used as condensing lenses supplementing the substage condenser on the microscope. A contrasty, fine-grained panchromatic film is used for most of the exposures. No filter, other than a piece of glass that gives daylight quality to the photoflood illumination, is employed. Direct magnifications on the film up to 7500 times are possible.

The photomicrographs that Mr. Snyder has turned out have been declared superior to those produced by laboratories having thousands of dollars' worth of microscopes and cameras at their disposal. This illustrates the results obtainable from simple equipment properly used.

Mr. Rollins and Mr. Snyder make photomicrographs of all suspicious-looking algae, as part of the process of identifying them. These pictures, supplemented by visual observations, are compared with illustrations in textbooks and standard references, until the specimen is identified positively or placed in the "unknown" file. Once the criminal has been identified, treatment is usually a matter of routine procedure.

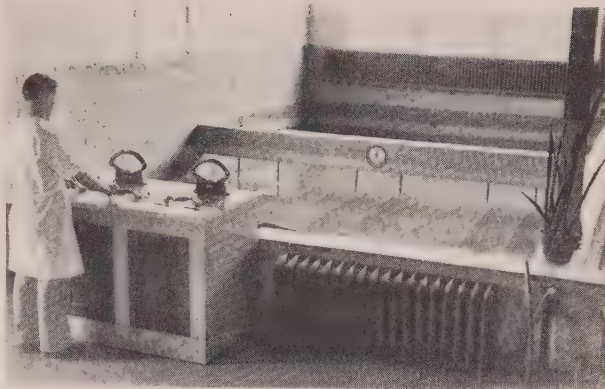
The most offensive invader of them all at the Barberton reservoir is *Synura uvella*, a two-tailed creature that likes to form gangs of fifty or so. A bunch of these organisms magnified six hundred times makes a spot about the size of a quarter. *Synura* is classified by some authorities as a protozoan or one-celled animal, while others regard it as a plant. The line of separation between plants and animals is not always clearly defined among the simple microscopic creatures of the type that cause trouble in water systems.

Whatever else it is, *Synura* is distinctly a pest. As few as three clusters of these organisms in a gallon of water will impart to it a distinct and not at all agreeable odor and taste. And at one time the count at Barberton was 531 clusters per gallon! The taste comes from an oily secretion manufactured by *Synura*. It is relatively easy to rid the water of *Synura* itself, but the odor and taste are likely to linger on in spite of everything. It seems that no two people agree exactly on what the odor is like. It has been compared with everything from cucumbers and geraniums to old muck and dead fish. *Synura* thrives on cold. For that reason, it gives the most trouble in the dead of winter.

Almost as bad is *Anabaena*, an alga that occurs as free-floating, single filaments, or that multiplies into a slimy layer. *Anabaena* is strikingly beautiful under the microscope, for the cells arrange themselves in various graceful curlicues. It offsets whatever beauty it may have, however, by generating an odor and taste that is described as "grassy, moldy and vile".

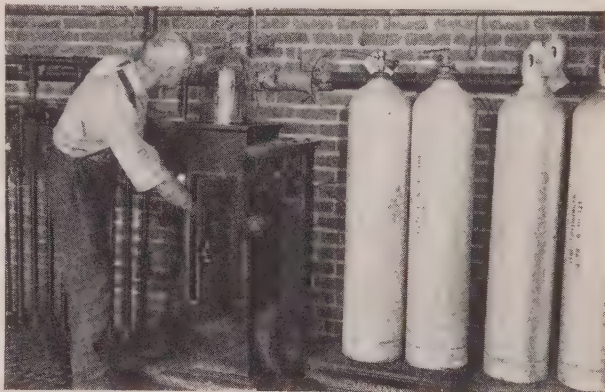
Asterionella, producer of a "pig-pen" odor, is another public water enemy. Its cells are arranged in the shape of a star, and usually are found floating near the surface of the water.

Elaborate and costly are the steps taken to rid city water supplies of these and other microscopic pests and the odors and tastes they produce. Usually the organisms



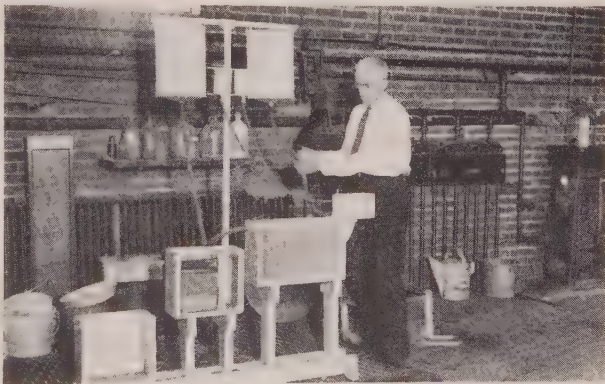
WATCHING THE FILTRATION BED

In this stage of the control of the drinking water the solid precipitates and other matters are removed under the eye of the specialist



DOOM TO THE UNWANTED INVADERS

Through this apparatus chlorine is added to the water in proper quantity to kill the algae and bacteria that have been discovered



A WATER PURIFICATION SYSTEM IN MINIATURE

F. L. Rollins demonstrates how algae are removed by chemical and mechanical processes, using a model filtration plant constructed for lecture purposes

put in an appearance so suddenly that it can be called a surprise attack. A water-works chemist may go home in the evening, feeling cheerful because everything is running smoothly, and be called out of bed before daybreak because indignant citizens are complaining that the water tastes like a policeman's hat band. The reason usually is discovered to be one of the alga pests that, for some reason or other, swarmed in without preliminary warning.

Treatment of water to purify it is seldom the same at each station, and varies from (Continued on page 509)

phenomena that are observable on the planet. When the North Belt has a period of maximum redness the South Belt has a period of minimum redness. This occurs at twelve-year intervals and at intermediate intervals the colors are reversed. At the past two oppositions the North Equatorial Belt of Jupiter has been remarkably red, as has the Great Red Spot, the most outstanding feature of the planet's surface since its discovery in 1878. It is suspected, though, that this spot existed long before that date and is of a semi-permanent nature. In color it varies from the deep brick red it possessed at the time of its discovery to a pale ghost of itself at other times. For the past few years it has appeared redder than it has been for many years. In size it is a greatly elongated oval, and is large enough to engulf the earth. A notch has apparently been carved out for it in the southern edge of the South Equatorial Belt, and below this has developed a dark region that has been named the South Tropical Disturbance.

There are, in addition to the Great Equatorial Belts of Jupiter, other smaller belts in higher latitudes that vary continually in number and appearance. There are, also, many smaller transient markings; spots, light and dark, mostly brown or reddish, and some green. All of these are phenomena of the planet's atmosphere because its surface, if it has one, is never visible. It is not known whether it is all gaseous or has a central solid, or semi-solid, core.

It has been suggested that short period comets may originate in the ejection of matter from the surfaces of the outer planets. If, as a result of an eruption, matter were to be ejected from the surface of the planet Jupiter its velocity would have to be $37\frac{1}{2}$ miles a second to escape the control of the planet. It would require a tremendous amount of energy within the depths of the planet's interior to produce such a velocity of ejection. It is considered possible that comets may be ejected from the sun, although the velocity of ejection would have to exceed 380 miles per second. There is a family of comets, including the Great Comets of 1880 and 1882, that are known practically to graze the face of the sun, passing through the solar corona within less than 400,000 miles of its surface. It is not impossible that they may have originally been ejected from the surface of the sun, especially since some solar eruptions have been observed to have velocities not far below the velocity of escape from the sun.

Jupiter has passed opposition to the sun and may be seen in the southern sky in the early evening in Capricornus. It is remarkable for its great brilliancy, which is surpassed only by that of Venus, and for the steadiness of its golden yellow radiance. The planets are distinguished

easily from the stars by the remarkable steadiness of their light as compared to the scintillating brilliance of the light of the stars. We may note this same steadiness in the light of Saturn. The Ringed Planet is much less brilliant than Jupiter. It is a pale yellow in color, and, although now slightly less brilliant than Vega, it is brighter than Altair, both of which may now be seen high in the western sky in the early evening. Saturn is now in Pisces and is in opposition to the sun on October 8, when it will be above the horizon from sunset to sunrise. It will be seen to the best advantage rather late in the evening when it will have attained a considerable altitude above the eastern horizon.

With a three-inch telescope one may see the Rings of Saturn, its belts and more conspicuous markings, such as bright spots in its atmosphere, and several of its brightest satellites; also the conspicuous Belts of Jupiter, the Great Red Spot, its four historic satellites and their varied phenomena, such as their transits and shadows, eclipses and occultations. One will soon note that the surface of Jupiter is remarkable for the great variety and color of its atmospheric phenomena, and it is this fact that makes it one of the most interesting of all telescopic objects, not even excepting the moon.

Venus will be at its greatest brilliance on October 16, but it is not at all well-placed for observation this month on account of its far southern position. In the tropics and southern hemisphere, however, it will be a magnificent object. In northern latitudes it will set within a half an hour or so after the sun. It should now be easily visible by daylight, if one knows where to look for it, because of its exceptional brilliancy. A good time to search for it will be an hour or so before sunset in the southern sky and not far to the east of the sun, although it may be readily seen at midday high in the southeast. This will be the last opportunity to see Venus in the evening sky this year as it will be in conjunction with the sun next month and will then pass to the morning sky.

Mars is now in the morning sky in Virgo, and its distance from the sun is slowly increasing, but it is not yet far enough from it to be seen to advantage. It is now so far from the earth that it is no brighter than a star of second magnitude. Mercury will be too near to the sun for observation this month.

Among the constellations the Great Square in Pegasus and Andromeda are now conspicuous in the east. Orion will not come into the evening sky until November. Bootes, with its magnificent Arcturus that has been with us throughout the summer, is now on the western horizon.

AMERICAN NATURE ASSOCIATION QUARTERLY BULLETIN

Copies of Numbers One and Two of The American Nature Association Quarterly Bulletin are available to all members of the Association on request to Membership Service, American Nature Association, 1214 16th Street, Washington, D. C. The issues deal respectively with general conservation problems and policies, and with a report of an important survey of roadside zoning in California. The third issue of the Quarterly, soon to appear, will deal with the field of conservation education, to be followed by an issue devoted to pollution.

THE STUDY OF PROTECTION

The first day in school is an experience of adjustment, in which protection plays a part. Examples of protection, similar to those employed by humans, may be found among other living things. To help in making these comparisons, the insert in this number of NATURE MAGAZINE is devoted to small water insects and may be useful wherever ponds and fresh-water streams are available for study. Experiences with these forms of life may and should start simply and become more searching as they are presented in the different grades.

Suggestions for the Earliest Grades

A survey of how children avoid danger might be a valuable introductory experience. Ask for experiences where danger has been avoided by absence, concealment, respect for others, cooperation with others, defense, reputation and making the best of it. Every child will have learned how certain dangers may be avoided by one or more of these means. Then look to the life of some water-way for similar examples.

As a body of water is approached, all sorts of things begin to absent themselves from the approaching danger. Water striders, whirligig beetles and their kind move over the surface in their characteristic ways, which may be mimicked by the children. Dragon flies, may flies and damsel flies escape by flight through the air over the surface. Diving beetles, back swimmers and water boatmen dive into the depths of the water from the surface, and hosts of little creatures burrow in the mud at the approach of danger. Many of these creatures may be identified by the pictures in the center of this number of the magazine.

Concealment is a common practice of those in danger, whether this applies to children avoiding punishment, or water creatures avoiding capture. This protection may be effected by coloration, by burrowing and by other means. Look at the water insects in a pond, or in an aquarium, to see how and when they conceal themselves. Notice how the coloration of water boatmen and water striders is thus effective. See how caddis fly larvae conceal themselves in little houses that they make of available materials. Remove a caddis worm from its case and put it in an aquarium with different colored strips of cellophane. Does it use any selection of materials in reconstructing its house?

Actual and effective defense is brought about by some aquatic insects that fight for their freedom with whatever means are available to them. A back swimmer held tightly in the hand may inflict an unpleasant injury, as may a giant water-bug, or a dobson fly larva. It is not always easy to judge how dangerous a creature is by the way it looks. A dragon fly may look dangerous and be perfectly harmless, certainly less harmful than a peaceful-looking back swimmer.

Which of all the animals found in a pond may and may not be handled with safety might well be a practical problem worth solving by a child beginning school. This

may, or may not, have a bearing on the general economic usefulness of the animals. Look through the pictures of aquatic insects in this number of NATURE MAGAZINE and try to decide by the way the animals look whether they would be dangerous to man, and how they would probably protect themselves. Check on reported damages by dragon flies, which are thought by some to sew up ears, and try to get a dragon fly to do this to see if it can live up to its reputation.

If it is necessary to substitute picture study for further enrichment of protection studies, unrivalled examples may be found in *Nature on Parade*, published by the American Nature Association. Particular attention is called to pictures in that book of coral-reef fishes, African mammals, mantids, antelope, wild geese, salamanders and so on. Study these pictures at close range and at a distance to get some idea of some of the ways in which the animals protect themselves. See also NATURE MAGAZINE'S *Guide to Science Teaching* for further suggestions at these and at other grade levels.

For Higher Elementary Grades

Build on the experiences outlined for the lower grades to notice what, if any, provision is made by the animals available for study to protect their food, air and water supply, their home range, young, freedom, health and position. Notice how this protection is effected in each case.

Using the water insect article in this number of the magazine to help, notice particularly how the air supply is protected in diving beetles, water scavenger beetles and in the haliplid beetles. Then find some of the beetles in neighboring waterways and observe what they do to protect their air supply. Add to this list the ways in which fresh air is reached by water scorpions, water boatmen, mosquito larvae and giant water-bugs. Get a few may fly nymphs and watch the way they move their gills to get the air from the water. Chase one of them about the aquarium and notice the change in speed of movement of these gills brought about by the exertion and need of oxygen.

When studying protection of food supply, such as is conspicuous with squirrels, look for similar instincts shown by aquatic and other insects. Of course, the possession of effective food-getting devices provides protection of a sort, but this hardly can be compared to storing up more than the needs of the moment demand. Few if any of the aquatic insects do any storage, but many of them protect themselves during dry and excessively cold periods by being able to suspend activities, or by going through the period as eggs. Go through the life histories of these insects to see how the insects survive unfavorable seasons.

Notice from pictures in *Nature on Parade*, or from the animals themselves, how the giant water-bugs provide protection for their young. Determine where each of the creatures available for study lays its eggs and try to understand why that place is appropriate in each case.

For the Highest Elementary Grades

Continue the studies outlined for the lower grades but note particularly how creatures modify their environment to meet the needs. Look in running water for the net made by one of the net-building caddis worms to see how it uses its moving environment to its advantage in food getting. Then see how this problem is met by caddis worms, which live in still water. Make collections of all the different kinds of caddis worm houses that may be found to see how they differ, and how each is appropriate for the place in which it is found.

Continue this study of modification of environment to provide protection by examining homes of those creatures that change their surroundings for that purpose. Interesting to study in this connection are pictures in *Nature on Parade* of spiders, king crabs, sand crabs, blue birds, muskrats, badger, deer mice, meadow mice and others. In general, most birds' nests may be collected without doing any harm at this time of the year. Make studies of the materials used in making them and try to locate the source of supply of each kind included. Look in the nests for feathers, hairs, bones and other conclusive proof of the presence, dead or alive, of different creatures of the vicinity. Hawks' nests frequently provide interesting collections of hairs and feathers of the creatures which served as food for the hawks.

For the Junior High School Years

Enrich the studies suggested for the earlier years by emphasizing the economic rôle of creatures available for study, to determine from which, if any, man should protect himself. In the charts dealing with aquatic insects, useful information on this point appears at the bottom of each column. Notice in this connection that many that have no apparent direct use to man are useful as destroyers of mosquitoes. The protection problem may then be recognized as being highly complex involving many creatures whose services are not always obvious.

Make lists of things commonly done by humans to water insects that are not sensible in terms of man's own interests. Note, also, as with the crane flies, that it is not safe to generalize and say that all kinds of these insects are either useful or injurious. Read Benjamin Franklin's "To an Ephemera", and notice how he made a mistake by attempting to apply a generalization to a situation he did not completely understand. He had the idea that the may fly completed its life cycle instead of just the adult stage of its life cycle, in a day. It is not even safe to generalize and say that all may flies complete their adult period of life in a day.

What other generalizations commonly applied by man to living things are equally ridiculous?

For the High School Years

Elaborate on the suggestions made for the earlier years and outline local projects for

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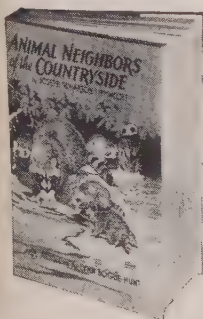
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ANIMAL NEIGHBORS OF THE COUNTRYSIDE

by

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INDOORS AND OUT

(Continued from page 455)

interest in the works of William Hamilton Gibson, it seems to me, depends on his seven volumes of general or miscellaneous outdoor essays—and more on their text than on their illustrations. If these essays were available in volumes of a convenient size, with only the selected best of the illustrations included and handled so as not to interfere typographically with the text, I have no doubt that they would still be widely read.

The best of these essays are written in an engaging familiar style. Many of them are pastoral in a precise sense, permeated by a rural sentiment that is evident in character sketches and transcriptions of dialect as well as in descriptions of the natural scene. "Pastoral Days," "Happy Hunting-Grounds," "Highways and Byways"—these are nice titles. Many of Gibson's essays deal with the smaller creatures. "Sharp Eyes" and "Eye Spy"—these make good titles, too. As a naturalist Gibson was most interested in the relationships of insects and flowers, a subject on which he was also a popular lecturer, using charts of his own devising. He was a close observer, and zealous to influence others to see sharply and not be blind in the midst of a world of small wonders.

Throughout his works there is evident a great interest in the seasons. *Pastoral Days* consists of four essays on the seasons. *Sharp Eyes* is arranged as a Nature calendar for the year. "A Witch-Hazel Cope" in *Happy Hunting-Grounds*, to cite an example of particular interest this month, is excellent reading for a description of October, and there are many other examples that may be found by other readers who may wish to experience for themselves these books that had such a wide influence in the days of their publication. I am sure that the experience will be both pleasant and worthwhile.

On Guard

By Irby Turnbull

A few days ago I observed a bird incident in my front yard that greatly interested me. We have a large rose arbor, and cardinals and brown thrashers nest there. Beyond, within thirty feet, catbirds and mockingbirds nest. The lady cardinal was on the nest. I was watching the birds on the lawn, and I noticed great commotion among the catbirds, mockingbirds and thrashers in front of the arbor. They were screaming and fighting, and all at once I saw the male cardinal flash from some place on the lawn to the rose arbor, and in a trice he began singing, pouring his sweet notes into the air. The cardinal is not much of a scrapper, but it occurred to me that he wanted to assure his mate that he was on guard.

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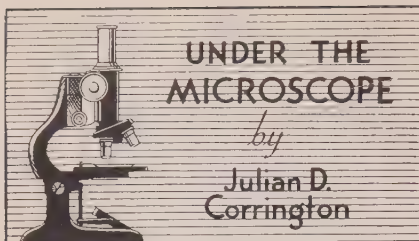
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SHALL WE HAVE A NATIONAL ORGANIZATION?

This Department has successfully passed through an experimental period of twelve installments and has demonstrated that there is a definite need for a section devoted to the interests of amateur microscopists. The response from readers has been gratifying, and the number of interested followers grows each month.

Those who write in to Dr. Corrington or send for literature come from every walk of life and live in many parts of the world as well as all over the United States—boys and girls, men and women; business people, teachers, doctors. The ages and professions of those who have taken up microscopy as an avocation are many and varied. Should this group organize themselves into the nucleus of a national association?

What would be the advantages of such a society? As your editor sees them, they would include the following objectives:

1. To provide a central clearing house for the exchange of ideas and information.
2. Members would contribute articles and other material that would then be re-produced by mimeograph or photo-offset and distributed to all other members.
3. The editor and other officers could provide additional material to be distributed in this manner. Since *Nature Magazine* goes to a large membership list of persons not interested in microscopy, it follows that the section devoted to this hobby could not be allowed more than a limited space; but longer articles or specialized subjects could be handled by mailings to members.
4. To furnish the necessary stimulus to further and improved work in microscopy which contact with others always introduces.
5. To meet and know others in your community with common interests. A central organization can send lists, classified geographically, to all members and thus serve to introduce them to one another.
6. To bring in new members and thus encourage others to adopt the hobby you have found attractive. Those who have already written in are doubtless only a fraction of either the existing or potential army of microscope enthusiasts.
7. To register the serial number of your microscope, if you own a professional model, so that theft or loss may be promptly reported to an organization maintained for this purpose by the manufacturers of optical equipment.
8. To form local chapters of the national society and in that way to establish local microscope clubs having the advantage of a parent, centralized organization, with a uniform policy. In certain cases, clubs already in existence may wish to affiliate as chapters. Such local associations have many advantages, including:



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- a. Enjoying business and social hours together.
- b. Working on common projects and problems, including field trips.
- c. Supervised instruction for the beginner and less experienced worker by those farther along in microscopy. The national organization would endeavor to locate some person in each community suitable to act as an instructor, where desired.
- d. Pooling of finances so as to purchase materials beyond the reach of each member individually, to become club properties. These include slide collections, a fine research microscope with oil immersion lens, a good photomicrographic camera, other accessories, books, dissecting and drawing equipment, subscriptions and exchanges.
- e. Receipt of a prepared booklet on how to organize and maintain a microscope club.
- f. Receipt of the more expensive catalogs of the optical companies, which cannot be sent gratis to individuals.
9. Members' names to be placed on the mailing lists of optical companies, to receive certain catalogs and booklets, as issued, without having to write in for them.
10. Information as to what other individuals and clubs are doing; what material of interest is appearing in other current magazines or in books; personal notes and news items dealing with microscopy.
11. A certificate of membership, suitable for framing or mounting in an album will be sent to all who join.

In order to sound out the interest in this suggestion, we have prepared a questionnaire that asks about your age, sex, occupation, equipment and that sort of thing, to give us the needed information. This sheet is being mailed out to all who have written in to us for one or more of the booklets advertised for distribution each month, and will be sent promptly to all others who will write and request a copy. The crux of the matter lies right here—if you are at all interested, send for a copy of this questionnaire immediately! Only in case the response is sufficient will we go ahead and take any further steps. It is up to you, and you should act now or forever hold your peace! Space is provided for your votes and opinions in the matter of a suitable name; amount of dues, if any, and so on.

As to a name, after sifting all possible combinations, our suggestion is: *The Amer-*

ican Society of Amateur Microscopists. Li it? Annual dues of fifty cents should be about right for the present, with the possibility that an increase to one dollar may have to be made later should the membership favor a more extensive program than can be covered by the smaller sum.

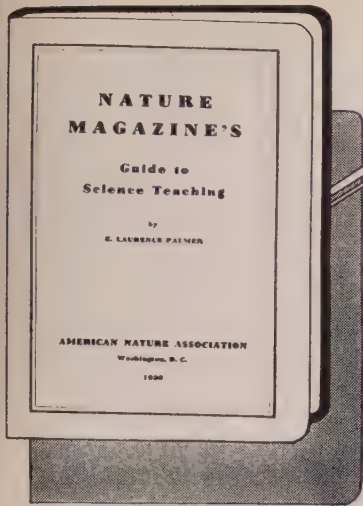
Your editor is willing to act in the capacity of permanent executive secretary, or something such resounding designation, and if accepted when the organization is on its feet we can have a constitution and elect the first slate of officers. Probably a President and a Vice President would be enough since an organization of this nature functions best when organized least—however these and many other details are up to you.

Such a society needs the backing of a publication of recognized standing and it can hardly be disputed that *Nature Magazine* is a most logical choice. The Magazine, as such, has no axe to grind in this matter, but is willing to act as a Fairy Godfather to the extent of continuing the present department. Under the Microscope, and lending its facilities in mimeographing bulletins, circularizing lists and the like.

It must be emphasized that this proposed society will be free and independent. It will not be merely a subsidiary of *Nature Magazine* or beholden to any of the manufacturers of optical equipment, or tied up in any way with advertising schemes. It will be of, for and by amateurs. There are many professional groups in our field, the most important one on this side of the Atlantic being The American Microscopical Society but it is not in emulation of or competition with such organizations that we make these suggestions to form our own association.

It will not be necessary to be a subscriber to *Nature Magazine* in order to join. Copies of the Magazine may be read in schools and libraries to keep up with what we are doing. As a branch of nature study microscopy has a most important place, and if our organization is successful and the members vote to do so, we might aspire to be taken under the wing of the American Nature Association. In case you do not know it, this Association is not at all the same thing as *Nature Magazine*; it has many activities and irons in the fire besides publication of the Magazine.

What do you say? Write Dr. Corrington immediately, then return your questionnaire at once so that results may be reported in the earliest possible issue. Send in names



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"I think that in general it is a very fine piece of work. It is very valuable for showing how otherwise unrelated pictures and experiences may be used for particular purposes, thus preventing the work from becoming haphazard and incidental." Dr. Victor L. Crowell.

"The approach to this subject is superb and the subject matter of high quality." Dr. W. H. Davis.

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of others to whom we should mail the questionnaire; all those affiliating by a certain date, not yet determined, will be considered as Charter Members, and their certificate will so state. Act promptly, please.

Daphnia and Company

From time to time we have alluded to the microcrustacea as a group, pausing only long enough in our discussions of pond life to identify them as minute relatives of the crayfish, lobster and crab. This month we shall trot out a few for inspection, beginning with Daphnia, the water flea, perhaps the best known of this numerous and widespread assemblage.

Daphnia has assumed an illustrious position in recent years among that select group of famous organisms whose names are linked with long teaching service or classical re-



LIVING SPECIMENS OF DAPHNIA, THE WATER FLEA (ABOVE), AND CYCLOPS, A FEMALE WITH EGG SACS (BELOW)



search—Amoeba, Ascaris, Drosophila, the Evening Primrose and many others, for it is large, as microscopic life goes, being about the size of a pinhead and plainly visible to the naked eye, and the enveloping shell, or carapace, is so transparent that many vital processes, such as digestion and circulation, are seen with ease in the living creature under magnification.

Reproduction occurs in two manners. Females produce "summer eggs" with relatively little yolk and these develop by parthenogenesis—that is, without fertilization—and mature rapidly. Later there are "winter eggs", which are fertilized by the male, and these have much yolk and develop slowly. The eggs are carried in a dorsal brood pouch and all stages in development may be observed



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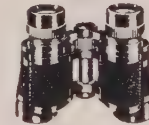
ments, capable of resolving out fine details. Try the Model R (above) 75 to 300 power, \$21, including walnut case and 455-page book by Prof. J. D. Corrington, "Adventure with the Microscope"; or New Gem (right) \$14.50. Other models, \$38 to \$774.50. Send for literature.



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through the transparent tissues of the living mother.

Because the summer eggs have only one parent and the winter eggs have two, *Daphnia* have been highly useful in genetic studies and in the environmental control of sex of offspring. They exhibit such marked adaptation to an easily regulated environment that they also have been widely used in research on adjustments and behavior. Finally, they are of great value as food for hydras, the young of commercial fish and adults of aquarium fish, such as the popular tropicals.

Daphnia may be collected at any time of the year, even beneath ice in winter. They occur in ponds and lakes, particularly in somewhat stagnant pools, and are best taken with a plankton net. They are also carried by leading pet shops and biological supply houses.

Due to their importance in so many lines of investigation, numbers of methods of culturing *Daphnia* in quantity have been devised. The principal conditions are to have an abundance of bacteria, on which these tiny crustaceans feed, and water that is cool, not too foul with organic matter and with at least a moderate amount of oxygen. Algae, yeast, decomposing plant or animal remains and manure cultures are all widely used by various investigators. Perhaps the simplest for the microscopist who wishes only a modest supply is the lettuce infusion by Dr. Libbie H. Hyman, prepared as follows:

Bring some Boston lettuce leaves to a boil but do not continue boiling. Place these in a battery jar, aquarium, or other container, at the rate of one large leaf for each six square inches of bottom and fill to a depth of six inches with pond water. Let stand three days, then add *Daphnia*. As the lettuce disintegrates, add more leaves and a few small pieces of raw liver, but only in moderate quantity so that the water does not become foul or cloudy as this will kill the crustaceans. Keep supplied with the lettuce-liver food up to the limit possible without clouding the water, a limit that must be learned by experience and that is marked by failure of the *Daphnia* to flourish properly. Whenever it becomes evident that they are not doing well in spite of fresh addition of food, they must be transferred to a fresh culture medium, as they will not live indefinitely in the original one.

Greatest interest attaches to studies of the living animal, but fixed and stained slides are also useful. Specimens may be killed and fixed by dropping them into 70% alcohol. Then dehydrate through the alcohol series, clear in xylol and mount in balsam, using cover glass props. For handling specimens, make a dipping tube by affixing a rubber pipette bulb to one end of a short length of ordinary glass tubing, thus making a pipette that has no constricted opening.

Daphnia may also be processed by the same methods previously given for *Hydra*, using borax-carmines as a stain. Still another method is to kill by heating slowly in a drop of water on a slide, staining in alum-cochineal, then dehydrating, clearing and mounting in balsam. Owing to their small size and delicate nature, ten minutes are sufficient in fixers and stains, five minutes each in alcohols and clearers.

Remarks about collecting, culturing and preparing *Daphnia* apply also to other species, with occasional small modification. There is *Cyclops* with the single median eye



Photomike Contest

This month's prize winner is R. G. Harrington, Altadena, California, for his beautiful shot of the black widow spider's egg sac. The camera was a Voigtlander 9 x 12 cm, with camera lens used but eyepiece of microscope removed; Atco Senior microscope; Eastman nitrate film; one number 2 fotoflood lamp in reflector; no light filter; exposure one-half second.

The runner up is last month's winner, Miss Jane B. Strohecker, of Reading, Pa., for a splendid enlargement of the lancets on the sting of a honeybee; while third place goes to Robert Alberty, Lincoln, Neb., for potato starch under polarized light.

If you haven't tried an entry yet, look up announcement and rules of these monthly contests in the May issue.

indicated by the name, in which the female carries two egg sacs trailing from the sides of the hinder end of the body; *Eubranchipus*, the fairy shrimp, found in freshwater pools in the spring of the year, with the habit of swimming on the back and having many appendages that bear gill tufts; *Artemia*, the brine shrimp, noted for its ability to thrive in solutions of high saline content; beach fleas, boat lice, scuds, fish lice and many others, marine, freshwater and, occasionally, as in the sow bugs, terrestrial. You will find the microcrustacea a most interesting group.

The New York Microscopical Society

Microfans residing in and about New York City may wish to affiliate with the New York Microscopical Society, an organization that grew out of a group of ardent microscopists who were professionally botanists, mineralogists and physicians, and of amateurs attracted by the sheer beauty and interest of microscopical objects. Meetings were held at first in the homes of members, later in a lodge room on Madison Avenue.

In 1877 the Society was incorporated and adopted as an official emblem the diatom *Asterolampra*, or Shining Star. Meetings are now held at the American Museum of Natural History, where the Society is affiliated with the New York Academy of Sciences,

and are called for the first and third Friday evenings of each month from October to May inclusive. Dues are \$2.00 per year for resident members.

Two features of the Society's programs of especial interest are the series of field outings and collecting trips from April to November, and the annual Exhibition of the work of members. That of the present year was the Sixty-First and was held at the Museum on February 26, the displays covering twelve tables with fifty-seven separate exhibits.

Officers for 1938 are Harry Taub, president; H. W. Zeiler, vice-president; F. Mennerich, secretary, 3-5 Potter Place, West Hackensack, N. J., to whom enquiries should be addressed; R. M. Wotton, corresponding secretary; G. E. Ashby, treasurer; Irving Banner, curator and J. E. Burke, librarian.

Trade Notes

Among magazines of particular interest to microfans is the British monthly, *The Microscope*, published and edited by Arthur L. Barron, 20/21 Took's Court, London, E.C. England. The American agent is Harry Ross, 82 West Broadway, New York City, to whom subscriptions should be addressed. The rates are \$3.00 per year; sample copy 25c.

We have been following recent numbers with interest and can highly recommend this publication. Each issue has 32 pages with many line drawings and two plates of excellent photomicrographs, with an average of eight principal articles per month. Subjects covered include microscopy proper, technique, photomicrography and the several sciences dependent on the microscope, as biology and chemistry.

School executives and teachers in science departments should have a copy of the 650-page fully illustrated catalog entitled *The American School and University*, put out without cost to the consumer by the American School Publishing Corp., 470 Fourth Ave., New York City. Write to them if you do not have a copy. An enormous number of equipment items and architectural and engineering plans are included, with many original articles and a chapter devoted to laboratory design and equipment. Microscopes and accessories are among the entries.

Carl Zeiss, Jena, is the official designation of one of the world's most noted manufacturers of optical instruments. Their New York office is addressed Carl Zeiss, Inc., 48 Fifth Ave. This month we are distributing three pieces of their literature to readers who will send a three-cent stamp to Julian D. Corrington, NATURE MAGAZINE, and request the Zeiss catalogs. One leaflet describes an inexpensive school microscope; a 24-page booklet is entitled *Microscopes and Accessories*, and an 8-page pamphlet takes up their photomicrographic camera attachment. All are well-illustrated and worth adding to your micro literature.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintaining a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., Washington, D. C.



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DAMS AND DESTRUCTION

(Continued from page 490)

the relief rolls. Yet it is an industry on its "way out". The fishways around Bonneville Dam have been moderately successful in allowing the fish to pass up stream. This success has been widely advertised to quiet opposition, but nothing is said about the impassable barrier at Grand Coulee Dam, or the projected high dams on the tributary Willamette. The salmon haven't a chance.

On the side of real need there is also a sad picture. With the railroads gasping for the breath of life, extensive inland waterways are projected at ridiculously high cost in terms of taxpayers' dollars. With more land in cultivation than we need, irrigation projects would open up more at a prohibitive carrying cost to the poor devil trying to develop it. On the power side, the power potential in the dams now completed or under construction is adequate to all present and visible future needs.

Yet in the face of all these facts the drives go on. Local businessmen scramble to get their share of the easy money, the larger proportion of which will come out of the pockets of the more populous East. They lead their political representatives around by their noses while they plump for projects only because they will mean that large sums of money will be spent in the region. The final costs and ultimate losses concern them not at all.

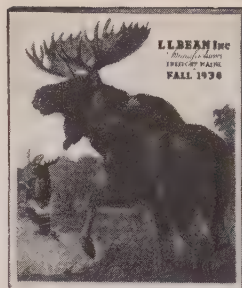
And more often than not these antics are paraded under the banner of conservation and wise use of our natural resources. It's a great age we are living in!

A Nature Film

Recognizing that the city child's remoteness from Nature presents a vital problem, "The Child Explores His World", a two-reel 16 millimeter silent film just now completed, sets forth children's museums as a solution and shows one in action, demonstrating a practical way of acquainting boys and girls with the world outside their experience. The film is based on the work of The Brooklyn Children's Museum, the first founded and the largest in the world. Produced by the Harmon Foundation, its prime purpose is to encourage organizations and communities throughout the country in the creation of museums for children.

The film emphasizes the contrast between the life of the city child, whose environment is largely man-made, and the life of his country cousin, who takes part in Nature's developments. A children's museum, it is shown, extends the experience of city children, bringing them exhibits of shells, woods, minerals, large scale papier-mâché plant and insect models, mounted birds and animals, and actual living things.

"The Child Explores His World" is already being used by adult museums in their stimulative campaigns, and by teacher training classes in visual methods. It is available to clubs, civic organizations, parent-teacher associations, schools, churches, and the like. Further information may be obtained from the Harmon Foundation, distributors, 140 Nassau Street, New York.



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As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

Fenton Does It Again

Carroll Lane Fenton is one of the very few able to write about geology and make it not only interesting but fascinating to the layman. He has amply proved this ability in previous books and articles in this field, and if there was any lingering doubt he has dispelled it in his latest volume, *Our Amazing Earth*. In the pages of this book we discover the history of our planet from its birth and through the geologic ages. It is a story that has vast bearing upon our lives today; on racial and nationalistic aspirations; on wars and threats of wars; on prosperity and on famine. Here is a volume that a number of our economists would do well to read to acquire a sounder basis for their reasoning. It is a book that every student will welcome as surcease from many of the older and far from inspiring geology texts; that anyone who ventures into the outdoors to travel in this country or abroad will find a source of added interest to his trip. In addition to the excellent textual treatment he has given to his subject, Dr. Fenton provides a wealth of picture material graphically supplementing his descriptions. The book is published by Doubleday, Doran and Co., and sells for \$4.50.

Stories of Horses

Gallant Horses is the title that Frances E. Clarke gives to her compilation of outstanding horse stories of our day just published by The Macmillan Company. Following on the heels of her two previous books in which were gathered, respectively, stories of dogs and cats, these three volumes now make a trilogy for the book shelves of all animal lovers. In this latest book Miss Clarke has again made a fine selection from a large list of horse stories she has read. We were delighted to see included that grand story, "Rodney", the story of a distinguished but obscure equine member of the A.E.F. by Leonard H. Nason. Among the authors whose stories appear in this prose anthology are Stephen Crane, J. Frank Dobie, John Galsworthy, William Dean Howells, Will James, Herbert Ravenal Sass and Alexander Woollcott. The price is three dollars.

Insect Oddities

Raymond L. Ditmars and Helene Carter have collaborated in text and illustration, respectively, to produce an attractive and interesting little book with the title *The Book of Insect Oddities*. In it has been assembled the story of insects of strange form and habit in many parts of the world, in-

cluding North America. The book is of interest both to the older young people and to adults. It is published by J. B. Lippincott at two dollars.

For Star Gazers

Combining both a detailed guide to the study of the stars and instructions for building instruments for astronomical work, *Starcraft* by William H. Barton and Joseph Marion Joseph is a valuable addition to the list of practical and popular astronomical texts. Mr. Barton is executive curator of the Hayden Planetarium in New York, and Mr. Joseph is a teacher. Hence both authors know what the beginner at star study wants to know. The book is profusely illustrated with drawings and half-tones. It is published by Whittlesey House at \$2.50.

Orienting Science

Ten members of the faculty of the University of Rochester have joined in providing the material for a valuable textbook entitled *An Orientation in Science*. While this volume is designed primarily as a first-year college text, it is of equal value to the individual wishing to refresh his or her earlier science studies, or to round out a general understanding of science today. The book seeks to present the scientific method of thought and procedure; to lay down the basic principles and problems underlying the various branches of science; to point out the various relationships between the fields of science. While the book presupposes a certain amount of secondary school background, in at least some of the sciences, to be helpful and intelligible, its contents are presented with relative simplicity. It is published by the McGraw-Hill Book Company and sells for \$3.50.

Appalachian Trail

Equipped with detailed maps and detailed description, *Guide to the Appalachian Trail in Maine* should be in the pocket of every hiker that takes to the trail in that State. In its 385 pages, inclusive of an excellent index, is packed a wealth of material. This book is published by The Appalachian Trail Conference, 901 Union Trust Building, Washington, D. C., and is available from the Conference at \$1.50.

Shade Tree Care

Under the title of *Our Shade Trees* Ephraim Porter Felt has written a book that should be of help and value to any owner of a cherished shade tree and to all concerned with the proper care of these trees. After a general discussion of shade trees and their problems of life, the author discusses general care, protection from natural enemies and proper selection of planting. It is a simple and practical book and is written by a man with a background of many years of practical experience. The publisher is Orange Judd and the price is two dollars.

About Coffee

The twenty-second in the series of botanical leaflets issued by the Field Museum of

Natural History, Grant Park, Chicago, Illinois, is on coffee and is the work of B. E. Dahlgren, chief curator of botany at the museum. Here we have a popular discussion of the history of coffee and coffee drinking, its production and economic significance. It is a fine addition to a splendid group of leaflets and is available for twenty-five cents from the Museum.

Alaska Wild Flowers

We wish that we might have received *Alaska Wild Flowers* by Ada White Sharpe earlier so that this review might have stimulated some of those going to Alaska this year to take along a copy in their baggage. However, make a note of it for next year for here is an excellent and profusely illustrated guide to the flowers of our northern territory. The book is published by the Stanford University Press, Stanford University, California, at three dollars.

A Valuable Work

The most significant contribution yet made to park and recreation work from the practical point of view comes from the National Park Service in the form of a three-part publication under the title *Park and Recreation Structures*. The first part is devoted to administration and basic service facilities; the second to recreational and cultural facilities; the third to over-night and organized camp facilities. Within each part the various types of structures are grouped, as, for example, in the first section with entrance-ways, checking stations; barrier-walls and fences; signs; administration buildings; superintendents' and staffs' quarters; equipment and maintenance buildings; drinking fountains and water supply; comfort stations; incinerators; fire lookout structures; tunnels; steps; crossings and culverts, and bridges. Hundreds of illustrations are provided and these are accompanied by detailed plans. To this visual material is added excellent descriptive and suggestive text. Albert Good, architectural consultant of the National Park Service, is the author and compiler, and may be proud of what he has contributed to park and recreation work. Not only do these books appear of indispensable character to anyone concerned with such activity, but they cannot help but be highly suggestive to anyone planning private construction of rustic nature. Copies of each part may be obtained from the Superintendent of Documents, Washington, D. C., for seventy-five cents each, paper bound.

Boy Scouts and Birds

In order to obtain the Bird Study Merit Badge a Boy Scout must be able to identify forty birds and to tell how to differentiate each from those species with which it might be confused. This is no small task, and the booklet *Bird Study in the merit badge series of the Boy Scouts of America* is an important aid in this and other directions in connection with Scout bird work. Roger Tor Peterson of the National Association of Audubon Societies has done an excellent piece of work in preparing this booklet which would be equally helpful to the bird student not a Boy Scout.

Diana Mott's

DOG COLUMN

MORE DOG DON'TS

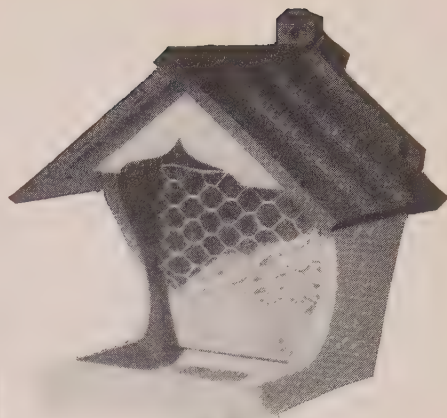
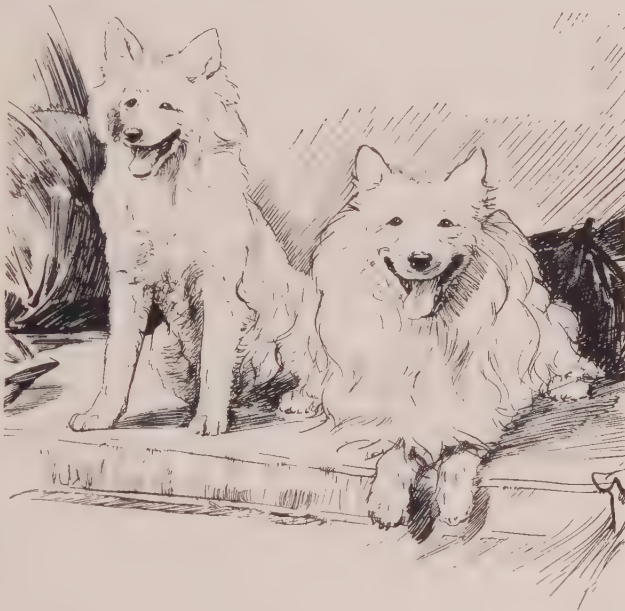
DON'T permit a child to become the owner of a dog or to control him unless he or she is old enough to understand the instructions in the small pamphlets given away (usually by manufacturers of dog medicines and dog foods), on the care and training of a dog, or unless you yourself can spare the time to supervise the job. Recently I heard the painful statement made by a friend of mine that he hadn't the time to train a dog himself and that he had had "one dog after another" for the children. All of them (the dogs) said he, had made "a mess of the house."

His little son, who was present and who begged to be allowed to have another dog, said, vehemently, "Please let me have another dog, Daddy. I'll train him. I'll keep him in the cellar. If he's not good, I'll tie him up and whip him."

It is just such a notion of dog training by some little children that is responsible for the savage dog bitings we read about in the newspapers. Nature gives the dog a set of teeth and good strong claws with which to protect himself. Man is his friend and he is Man's, but, when driven to despair, tormented and maddened and terrified, is he to be blamed if he loses control of his temper and actions? Anyone who believes that a dog can be trained by whipping and locking up is pitifully unaware of the truth. Only patience and kindness can teach a dog to do your bidding. Any dog, no matter what breed or age, is only too willing to do what his master desires. BUT, the master must take the time and trouble to help the dog understand.

DON'T encourage your dog to bark. Discourage him! Teach him that a bark is to be used in an emergency, under given and *shown* circumstances. Even though you live in apparent solitude in the country, and your nerves can stand it, a barking dog is certain to get you and himself into trouble. The barking of dogs has become so great a nuisance in the Antipodes that the Australians are operating on their vocal chords as a compulsory measure to abate the plague. It is not necessary to go as far as this. By forethought and teaching, the most stubborn and intractable dog can be taught not to bark.

DON'T teach or permit your dog to run after your car as a lazy method of exercising him. That, under modern conditions, is not only foolish but cruel. Even if your dog is the field and track type—greyhound, Dalmatian, collie—the public roads today, the roads on which you drive your car, are no place for him. Try running after a fast-driven car yourself, filling your lungs with dust and gas fumes, if you need a demonstration to show you the reason for so obvious an admonition.



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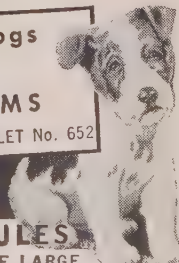
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NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

At Tanager Hill

"One should be a poet to picture the life of a bird bander, a life in which every sense is stimulated, every perception is sharpened and each day becomes an adventure." So writes Marie Andrews Commons in *The Log of Tanager Hill*, a book that will delight every bird lover, particularly every bird bander. Tanager Hill comprises thirty acres of highly diversified land on the shore of Lake Minnetonka, Minnesota. Thus a wide variety of bird species were attracted, banded and yielded records. And this book is a presentation of these records that were kept with amazing care and efficiency, plus an enthusiasm born of love of birds. The author dedicates the book to her husband, the late Frank Watkin Commons, who found, in bird banding, activity and adventure that failing health otherwise would have denied him. Banding activities at Tanager Hill started in 1923. This excellent book is brought out by Williams and Wilkins, Baltimore, at \$2.50.

The Tetons

Anyone who has visited or plans to visit Grand Teton National Park will wish to have a copy of an attractive little book, *The Tetons*, by Fritiof Fryxell. The author provides a subtitle—"Interpretation of a Mountain Landscape"—and his interpretation is both descriptive and informative, treating with the past and present of this rugged region. Illustrated attractively, printed beautifully, supplemented by a map, the book is brought out by the University of California Press at \$1.50.

Animal Neighbors

Joseph Wharton Lippincott adds another book to his list of stories of wildlife in *Animal Neighbors of the Countryside*, a collection of observations and experiences in the wild, entertainingly written and full of informal information. This is the sort of book you can pick up and open anywhere to read a few pages and find something of interest. The author treats his text in a random and pedestrian way just as one would encounter its creatures in outdoors wandering. It is a most appropriate method. Lynn Bogue Hunt collaborates with 45 line sketches. The publishers are J. B. Lippincott Company and the price is \$2.50.

Suwannee River

This is the title of a book about the "Strange Green Land", the source of the Suwannee River, Okefenokee Swamp of Georgia, and the course of the river as it flows into Florida. It is a story of the mystery

of that region; of the people; of the wild life that teems within it. The author is Cecile Hulse Matschat, and this book is the third of a series in which the story of America emerges through the folk and the folklore; the history, legend and wildlife of a river. The other two dealt with the Kennebec and the Upper Mississippi. The publishers are Farrar and Rinehart; the price, \$2.50.

Mt. Rainier Flora

Devoting itself to those flowering plants that are usually called "flowers", a 131-page mimeographed issue of Mount Rainier National Park Nature Notes represents a valuable contribution by the park naturalist, C. Frank Brockman. The author has done an amazing job within the limitations imposed by this form of reproduction and he has reason to be proud of an excellent index that makes this material definitely useful.

Two Nature Books

Lasius, the Lucky Ant and *Children of the Golden Queen* are two recent additions to Nature literature in the insect field for the younger generation. These two attractive, informative and entertaining books reflect the growing interest in insects, although the social insects have long come in for the most popular attention. The books are the work respectively of Nina A. Frey and Flora McIntyre. Miss Frey tells a straight descriptive story of *Lasius* without resort to dialog, and it is an exciting and enthralling tale. Miss McIntyre makes occasional use of dialog but it is credible. She is a daughter and granddaughter of bee-keepers and her story is as accurate as it is entertaining. Both books are published by E. P. Dutton and Company and each sells for \$1.50.

Blachly Poems

Clarence Dan Blachly is a prolific poet with varied interests, one of which is the outdoors. His poems have been brought together in a set of four little volumes of some 350 pages each with the titles of *Overseas*, *Borderlands*, *Native Notes* and *Philosophy for Every Day*. Any one of these may be slipped into the pocket for quiet reading wherever one may roam, and they provide varied fare for the poetry lover. The set complete sells for \$1.50 and may be ordered from Edward Blachly, 157 Chamber Street, New York City.

Pennsylvania Birds

An attractively printed and illustrated booklet, full of information, is *Pennsylvania Bird-Life* prepared by Leo A. Luttringer, Jr., and published by the Pennsylvania Game Commission, Harrisburg, of which Mr. Luttringer is educational director. Following general background material on birds and bird study, data is given on some common Pennsylvania birds. There is material on bird banding, bird photography, bird houses, feeding stations, etc. The price of ten cents for this booklet is amazingly low.

All About Roots

There is fascinating and surprising reading in *Roots, Their Place in Life and Legend* by Vernon Quinn. It is a volume that will appeal to anyone interested in growing things,

or anyone intrigued by the odd in legend or regional superstition. There are chapters on root habits, edible roots, poisonous roots, old remedies and present-day remedies for roots, the value of roots to Indians and roots and superstition. The text is splendid, the book is physically most attractive, thanks to the drawings of Marie A. Lawson and a fine job of book-making done by the publishers, Frederick A. Stokes Company. The price is two dollars and here is a suggestion for a novel Christmas gift to a garden-loving friend.

About Fox Terriers

Covering both the wire-haired and smooth coated breeds, *The Complete Fox Terrier* will be a book of interest to owners and breeders of these dogs. Written by Irving Ackerman, the book covers the history, discussion of outstanding members of the breed and information on the care both of individual dogs and fox terriers in numbers at a kennel. It is published by Orange Juice Publishing Company and sells for \$2.50.

Indiana Year Book

As always the year book of the Indiana Audubon Society contains much of interest to bird lovers and students of the feathered world. Many interesting records are presented, together with reports of studies and observation notes. A limited number of copies are available at one dollar a copy from Harold Zimmerman, 915 West Gilbert Street, Muncie, Indiana.

Mt. McKinley Fauna

The third volume in the Fauna Series of our National Parks is devoted to the birds and mammals of Mt. McKinley National Park, Alaska. It is the work of Joseph Dixon and is based upon six expeditions to Alaska for study. Comprising 236 pages inclusive of index, and including many pictures, this is a valuable contribution to natural history literature and of special interest to any Nature-minded visitor to Alaska. Copies are available from the Superintendent of Documents, Washington, D. C., for 35 cents in cash.

Palestine's Nature Magazine

Hattevá Vebaaretz (Nature and Country) published in Palestine, in Hebrew, has come to our attention. Articles on the European Tortoise, Protective Colors, Snails in Summer, December in Palestine, Our Forests, Cuckoo, the Tracks of Night, and Brood of the Owl in the copy before us, indicate that it caters to a breadth of interest that is similar to that of lovers of the outdoors the world over. Its contributors include specialists in the various sciences from a number of universities and departments of research in Palestine and from several European centers of learning. Besides publishing ten issues each year the magazine periodically publishes books on scientific subjects at a nominal cost. *Hattevá Vebaaretz* seeks no profit, but, naturally, desires to remain self-sustaining, and to this end bespeaks the support of interested persons everywhere. Additional information may be obtained by addressing its American office, Suite 2307, 1440 Broadway, N. Y. C.

Edward F. Bigelow

It is with regret that we must record the passing at the age of 78 of Dr. Edward F. Bigelow, naturalist, writer and lecturer, at Old Greenwich, Connecticut. At the turn of the century Dr. Bigelow became identified with Nature Study and the remainder of his life was largely devoted to this work. After serving at several schools as a teacher, he was active in the newspaper field, which work brought him to Stamford, Connecticut, where he established the *Stamford Telegram*. The natural sciences, although an avocation, called strongly and he became president of the Massiz Association, which was devoted to the promotion of scientific education. Under his auspices the Bruce Museum was organized and Dr. Bigelow was its head until early in this year, when illness forced him to turn in his active direction over to Dr. Paul Griswold Howes. Dr. Bigelow's interests were varied, his enthusiasm never flagged and his contribution to Nature education represents a splendid monument to his name. He will be missed, a tribute we all hope to earn.

About Friendly Animals

Entertainingly written, beautifully illustrated and splendidly printed, *Our Friendly Animals and Whence They Came* should find a ready audience. It is written by Karl Patterson Schmidt, of the Field Museum of Natural History, and is illustrated with twelve large-sized, colored illustrations and many smaller marginal drawings by Walter Louis Weber. It is the story of the origin of our domestic animals, written in simple but not juvenile style. While physically this book might be mistaken as something designed only for the youngest members of the family, it actually is presented in a way that will fascinate the oldest. The publishers are M. A. Donohue and Company and the price is \$1.50.

Park Portfolio

Four attractive picture booklets form the *Portfolio on the National Park and Monument System* published by the American Geographic and Planning Association, 901 Union Trust Building, Washington, D. C. Each booklet contains 32 pages, and they are devoted to "What Are National Parks", "Conservation of Nature", "Preservation of History", and "Facilities and Service". The four booklets together are available for seventy-five cents.

WHAT'S IN THE RESERVOIR

(Continued from page 497)

to day at a single plant. A common method of treating water to rid it of algae is to dump copper sulphate into the reservoir; but Rollins found that this worked the wrong way for him. The dead algae, in great abundance, decayed and produced a worse odor than before. So copper sulphate was abandoned. It was found that aeration increased the bad effects from many forms of algae. Apparently the agitation caused by the passing of water through the aerating chamber caused the organisms

to liberate the vile oil more abundantly.

Activated carbon in combination with other chemicals seems to be the most effective weapon for use against algae, at Barberton at least. This carbon looks like fine soot, and is made by grinding wood charcoal into powder and activating it with steam. This material, although it has been in use for more than two hundred years for clarifying whiskey, is relatively new in the science of water-treating. Its effectiveness depends on its ability to adsorb (not absorb) smelly and bad-tasting substances. Normally about ten pounds of activated carbon are used for each million gallons of water; but during a particularly severe *Synura* invasion at the Barberton plant, 150 pounds per million gallons were used. This carbon costs about \$120 a ton.

In addition to activated carbon, ammonia, chlorine, alum, lime and carbon dioxide gas are added to the Barberton water to rid it of algae, bacteria and odors. Some of these materials are fed into a mixing chamber automatically, and others are added at various points as the water passes through the plant. Because of the action of some of the chemicals, precipitates are formed, and carry about seventy-five percent of the impurities down with them. The remaining percentage is removed by filtering and by the action of chlorine.

When a city water consumer discovers that his faucets are pouring forth a fluid that smells like a pig-pen and tastes like he imagines a pig-pen would taste, the chances are that the water-works is several jumps ahead of him, and already has begun treatment. Perhaps the odor has been removed entirely from water leaving the station; but the mains still are full of the smell. Although it may be disagreeable to nostril and palate, water upon which algae have directed their chemical warfare is not dangerous to drink, after it has passed through a city water plant. The algae themselves are no longer present in it—only the odors and tastes produced by them.

Bacteria in city water give much less trouble than algae. It is relatively easy to get rid of even the most dangerous disease-producing types by modern methods. But it is not always possible to rid the water entirely of an odor or taste generated by algae.

Water users often wonder just what the city mains deliver to them besides water—what chemicals are present. This is of importance, too, in laboratories, photographic darkrooms, factories and other places where city water is used as a solvent in chemical processes. Here is a typical analysis of water from a faucet of the Barberton system:

	Parts per million	Grains per gallon
Silica (SiO ₂)	2.1	0.12
Iron (Fe)	0.02	.001
Calcium (Ca)	46.00	2.07
Magnesium (Mg)	5.00	0.29
Sodium (Na)	3.10	0.18
Potassium (K)	2.10	0.12
Carbonate (CO ₃)	None	None
Carbon Dioxide (CO ₂)	None	None
Bicarbonate (HCO ₃)	50.00	2.90
Sulphate (SO ₄)	30.00	1.75
Chlorides (Cl)	3.00	0.17
Nitrates (NO ₃)	0.15	0.087
Total dissolved solids	130.00	7.70
Total hardness	95.00	5.60
17.1 parts per million equal 1.0 grain.		
143 pounds per million gallons equal one grain per gallon.		

Adventures in Science

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No. 34—Relating Home and Garden.
No. 35—Garden Roses.
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No. 40—How to Make and Maintain Your Lawn.
No. 41—Camp Cookery.

also

American Nature Association
Quarterly Bulletin, Nos. 1 and 2.

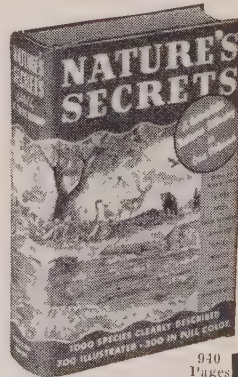
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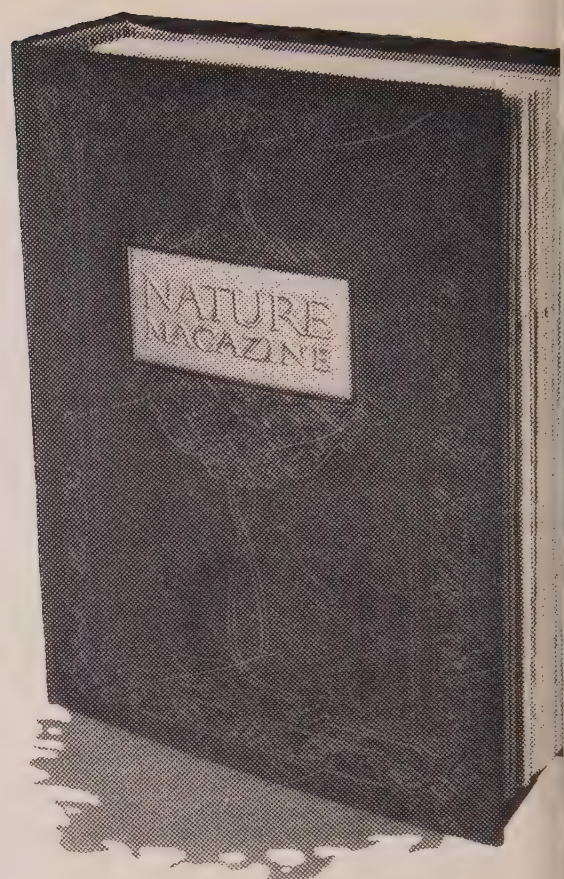
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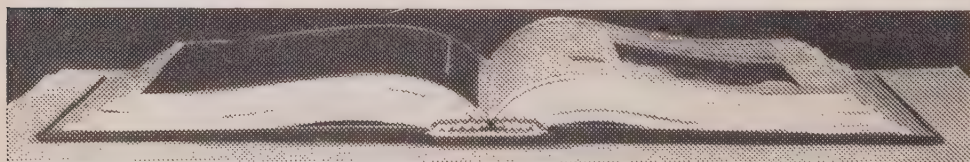
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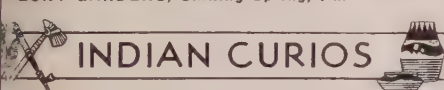
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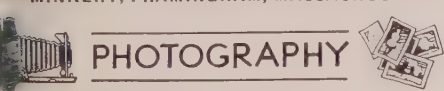
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Cape Cod Picket Fence

Some of our garden-minded readers may be interested in a new, attractive and durable fencing for garden edges, lawn edges and other places about the yard. This has recently come to our attention and seems to be something entirely new. The pickets, and the links between, are steel, and available in white or green, or combinations of white and green. Pickets are available in heights from twenty-four inches to forty-eight, and the links from ten to sixteen inches. Various effects are possible. It being contrary to our editorial practice to advertise developments of this sort in our editorial columns, readers interested should send us a postal card, or note, and we'll pass it on to the manufacturer who will send further information.

Lucky Stone of the Seminoles

By Decima Hunt

Hidden away in the lower Everglades of Florida are the Seminole Indians, one of the few remaining tribes of our native Americans. These primitive people have adhered more closely to the natural characteristics of their race than probably any other of our natives. They have fought back civilization with a tenacity that has kept them a reserved and primitive race. They have their own standards, and make their own valuations. To gain their confidence, one must respect both.

The great majority of them never venture beyond their own villages and "hunting grounds." To be sure, there is a show place near Miami where a "Seminole Village" is exploited, but it bears about as much likeness to the real thing as did the Eskimo's igloos at the World's Fair. Make no mistake, we who visit the imitation village are re-

garded by the Indians in much the same light as we look upon the hippopotamus in the zoo. We are the ones who perform for their benefit.

Living thus, set apart by the traditions of their race, they retain the natural instincts given to those privileged few who live close to Nature. For instance, when our weather bureau warns us that a tropical hurricane is forming down in the Caribbean Sea, these Indians have already sensed the danger, and have moved inland to higher ground. Ponce de Leon found these Indians in Florida. Through the ages the hurricanes have swept over the peninsula, yet miraculously, few of them have ever been killed by the storms. Why? The Seminoles will tell you that only those die who do not live in the aurora of protection that haloes the possessor of a lucky stone.

You may ask: "What are these 'lucky stones'?" Where can they be found? Well, in the first place, a lucky stone is not a stone at all. Although seemingly as hard as granite, it is really the seed of the nicker-nut, *Guilandina crista*, a prickly plant of the Senna family, that grows on the keys and lower parts of the coast of southern Florida and the nearby islands. It is a straggling vine-like shrub that is armed with hooked spines that have given rise to the local names hold-back, and wait-a-bit vine. It has great twice-pinnate leaves, and panicles of dull yellow blooms that develop oval pods two or three inches long, each bearing a few seeds. These are battleship gray, about the size and shape of a small hickory nut, with a prickle at the end that is soon worn away.

This is the matter-of-fact description of the plant, but in the spiritual concept of the Seminoles the plants that produce these "stones" grow in the caverns of the deep, and are very rare. To seek such charms constitutes the life work of some of these Indians, especially those of Spirit Knowledge. To offer to buy one of these stones is to commit the unforgivable offence.

I walked with a party of my red brothers, combing the beach after a tropical gale. With microscopic intensity they searched the sands and looked among the debris. Queer treasures they garnered there, but none so desirable to them as the lucky stones. For days they searched, and found, between them all, only a small handful. I have three; only one of these I found myself.

Do you know that if you wear a lucky stone, the germs of disease cannot find you, and that those who approach you with evil intent in their hearts are driven back? The Lucky Stone surrounds you with an aurora of protection that even the poison insects and reptiles of the swamp cannot penetrate. If you give one of these stones to another, a sincere desire for their welfare must motivate the gift else evil will befall you. You must never part with one for personal wealth or gratification, or your protection from evil spirits will vanish.

Let the scientific mind scoff and the sophisticated ridicule. I wear my lucky stone. I venture into swamps and forests, I crawl into caves and dens, I stand in the storm unafraid. You who visit Florida or the islands of the tropics next winter, seek for the Lucky Stone. And when you find it, remember and believe, as the Seminoles believe, that the great God of Nature, who gives you the Lucky Stone as a symbol of His protection, will never fail you if your heart is right with Him.



The ASSOCIATION



Copies of Numbers One and Two of Volume One of *The American Nature Association Quarterly Bulletin* are available to all members of the Association on request to headquarters. The July *Bulletin* has attracted wide attention in quarters where civic leaders are struggling with solution of the problem of ugly roadside billboards and commerce. California's program has now gone far enough to draw some effective conclusions, as this report definitely proves.

It is with regret that we must record the passing of one of our most valued and loyal members, Miss Anna W. Ely of Philadelphia. Miss Ely, who had been a member of the American Nature Association since its organization, passed on in Pasadena, California. Among the several educational organizations named in her will was the American Nature Association, both as direct beneficiary and as residuary legatee of trusts established. Miss Ely was always actively alive to wildlife problems and to the vital need of conservation, to which work the funds given us will be devoted.

Periodically news sheets are sent out to more than two thousand daily newspapers by the Association. These

present timely stories devoted both to conservation problems and to natural history facts that seek to stimulate a broader public interest in Nature and the outdoors. This is one of the various services of the Association, and clippings received reveal a general cooperative attitude on the part of many newspapers.

We have been asked to define "membership in The American Nature Association." Simply, it may be said that all those paying subscribing membership dues direct to the Washington office of the Association are members, and are entitled to all bulletins and other announcements of the Association.

Members of the Association who responded to, or were interested in, the preservation of the bird sanctuary for "Of Thee I Sing" will be happy to know that it is progressing splendidly and was host to a large assemblage of birds this year. They will also be interested to know that D. Appleton-Century has accepted for publication a book by "Of Thee I Sing" about her birds and the sanctuary. The author's profits from this book will be used for the improvement of the sanctuary, including the construction of a dog- and cat-proof fence.

Membership Application Blank

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A Talking Crow

Jet, by Rhoda Bacmeister, is the true story of a talking crow, written for youngsters from six to ten, and delightfully so. We are considerably more than ten but we enjoyed reading it, too. In fact, we started reading just to get an idea of the story and went right on to the finish, proving we haven't grown up yet, after all. *Jet* was a remarkable crow whose reactions to sympathy and human friendship were remarkable and indicate that the gap between us superior animals and the so-called lower animals is not so wide as we often think. Mrs. Bacmeister has told the story charmingly and this is a delightful gift for any youngster. The publishers are E. P. Dutton and Company; the price one dollar.

Three Verrill Books

On the heels of a more recent book, three earlier Nature books by A. Hyatt Verrill have been brought to our attention by his publishers, L. C. Page and Company of Boston. These are *My Jungle Trails* and two more volumes in his series of strange stories of Nature, titled *Strange Birds and Their Stories* and *Strange Insects and Their Stories*. As the titles of these last two indicate, Mr. Verrill has drawn from his own experience and from published literature to assemble the oddities in the bird and insect world, about which he writes entertainingly, supplying the illustrations, some of them in color, himself. The jungle book is the story of exploration and adventure in Central and South America. This book sells for \$3.50, and the two books in the "Strange" series for \$2.50 each.

About Vitamin B1

Students of vitamins and doctors will find interesting and valuable the book *Vitamin B1 and Its Use in Medicine* by Robert R. Williams and Tom Douglas Spies, published by Macmillan at five dollars. It is one of the Macmillan Medical Monographs.

Walker Prizes

Announcement is made by the Boston Society of Natural History of the subjects for 1939 and 1940 for the two annual prizes founded by the late Dr. William Johnson Walker. These are for the best memoirs written in the English language, and, in 1939, must be in the field of general zoology. The 1940 subject must be in the field of geology and mineralogy. For details send a stamped return envelope to Clinton V. MacCoy, Boston Society of Natural History, Boston, Massachusetts.

Azaleas and Camellias

Against a background of actual experience over a period of years, six members of the River Oaks Garden Club of Houston, Texas, have collaborated to produce a little leaflet on the culture and care of azaleas and camellias. This is a concise and complete discussion that should be of inestimable value to any gardener. Copies are available from the club at twenty-five cents each.

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Photographic Notes

BY NORRIS W. HARKNESS

Autumn Color

Never since the days when the first golden-rod announced the imminent reopening of school have we agreed with the poet who called these "the melancholy days". The dark-room has been too hot for comfort and we fell easily into the summer doldrums, but now the crispness in the air gives us a new vigor, and the first frosts bring us a fascinating opportunity for picture making. It is not the easiest kind of photography, this capturing of Nature's annual celebration, but the results are well worth the effort.

Since the beauty of fall landscapes lies in the riot of color rather than in the play of light and shadow, color film is the obvious thing: it is almost demanded. Of course, we can make fine pictures in black and white, and the right choice of filters will allow us to record much of the feeling of the colors, but this season above all others is the harvest time for the photographer who has color film in his camera.

The color films most used in this country are Dufaycolor and Kodachrome. Both are faithful in their reproduction and neither requires any special equipment. We must remember, however, that the latitude of color film is much less than that of black and white; that is, our exposures must be more accurate and we must avoid great contrast. In black and white work our best pictures are made across the light, or a bit against it, but with color film we shall do better to have the light more nearly behind us so that the scene is more evenly illuminated. Dark shadows become empty holes, and we must try to avoid them, or, by careful choice of view-point, keep the darker areas in a subordinate position in our composition. We must remember, too, that we are now making our composition of color rather than entirely of form, and we must see that each detail of the scene fits into the picture as it should before we snap the shutter.

The choice of film is dictated largely by the size and kind of camera we shall use. Kodachrome has long been available in the 35 mm. size for miniature cameras, and by the time this is in print, will be obtainable in most of the popular sizes of cut film for the larger cameras that are equipped to use this kind of material. Dufaycolor comes in all the regular sizes of roll and cut film, and has more latitude than Kodachrome and gives slightly softer colors. Kodachrome is more critical in exposure and the colors are more brilliant. The purchase price of either includes the development of the film by the maker, and most of us will prefer to let the manufacturer do it, although the development of Dufaycolor is simple for the more advanced amateur. Kodachrome must be returned to the factory for processing. The returned pictures will be positive transparencies—not negatives—and will be accurate reproductions of the scene we shot provided our exposures were right.

For nearly all of us, then, the lesser latitude of these films calls for an exposure meter and we should be thoroughly familiar with the use of the meter before we try color work with it. In making the meter reading we should include only the principal part of our picture and be sure that we are not getting too much of the light from the sky. This means that we should be as near the center of interest of the picture as we can when we make the reading, and that the meter should be tilted down enough to get the light reflected from our picture itself without being influenced by the direct light from the bright sky. When a small object such as a flower or a brilliant group of leaves is to be photographed, the meter must be held close enough to the object to have all the light affecting the meter come from the object: other things nearby probably need a different exposure and light from them would keep our reading from being correct.

Samuel Brown passed on suddenly, after a brief illness, on September first. His conduct of this department had been marked by a loyal interest in its readers and an unflagging enthusiasm for his subject. We shall miss Sam sincerely. His work will be carried on by the new editor, whose name appears above, and who has, on occasion, collaborated in the preparation of this department. Mr. Harkness has had wide photographic experience and is widely versed technically. He will appreciate any suggestions from any readers.

Either film should be rated at 8 Weston, or 17 Scheiner.

If we have no meter, the following may serve as a guide for open landscape work from now until the middle of November during the brighter hours of the day: Bright direct sunlight, 1/25th at f/8 or 1/50th at f/5.6; slightly hazy days, 1/25th at f/5.6 or 1/50th at f/4.5.

These values are for average landscapes with the sun coming over one shoulder. If the light is from the side, the exposure should be doubled. The printed matter that comes with the film should be studied carefully and its advice followed. The maker of the film was not guessing when he included it. For exceptional scenes it is sometimes worth while to make more than one shot, giving slightly different exposures so as to be certain of getting exactly what we are after.

When our transparencies have been developed, prints may be made from them, although they are too difficult for most of us and are rather expensive when we have them made; or we may project them as slides in any of the machines for the purpose. There are also several small viewers that enable us and our friends to enjoy them. However we may show them, we will find their making exciting and their possession worth while.

The more skilled photographer who wishes to have the thrill of developing his own Dufaycolor film will find full directions and formulae in the film package, or he may obtain them from this department. The process, known as "reversal", involves the development of the negative image as in black and white work, the removal of the

silver forming this image by bleaching, a second exposure to affect all the silver not used in the first image, and finally, the development of this silver to make the positive image. It sounds complicated, but the photographer who can make a good black and white negative and who can follow simple directions will find no difficulty with the logical series of steps, and the few additional chemicals needed are inexpensive. We feel that no one who has had the fun of doing his own processing will want to miss it.

If you wish this department to send you information on both of these films and on the Dufaycolor development process above, please enclose a 3-cent stamp for postage.

Printing

(Continued from last issue)

One thing more needs to be considered before we leave the subject of contact printing and take up enlarging. That is the choice of the correct grade of contrast in the printing paper. The human eye can detect some 500 shades of gray between black and white, the negative can see perhaps 200 of them, but the printing paper can show only 60 or less. Our negatives, then, must be developed to contract this range of tones in the original scene to approximate more nearly the limits of the paper, but it may be that our development has not been so carried out as to give us just the number of shades in the negative that it ought to have. If we developed the film too long or at too high a temperature, we have too long a scale in the negative; it has too much contrast between the shadows and the highlights and we must use a paper of long scale to match it. Such a paper is called—contradictorily—"soft". If we have erred in the other direction, our tone range is short, the negative is soft or flat, and we need a "hard" paper. Proper matching of negative and paper is imperative if we are to make good prints.

We try to develop our negatives to the so-called "normal", but the need of soft or hard paper is no confession of weakness in our technique because the range of tones—the contrast—in different scenes varies and that in the same scene changes in different lights. A negative exposed in bright sunlight will have more contrast than another made at the same spot on a hazy day; a landscape or a snow scene in the woods will be more contrasty than a shot at the beach. The former would print better on softer paper, the latter on one of the harder grades. The manufacturers, recognizing these uncontrollable variables, supply most papers in several grades from the soft (usually given the lower number if the series is numbered) to the extra hard, which is generally useful only for the reproduction of black and white line drawings or printing, without intermediate tones. A hard or contrasty negative calls for soft paper; a flat negative for hard.

We must choose the grade of paper that will best match our negative and reproduce our scene as it was or as we wish it to be. Our exposure will be just enough to give the faintest hint of color in the brightest highlights—there should never be any bare paper in the print—and the grade of paper will determine the tone of the shadows at the other end of the scale. From the appearance of the darker parts of the print we know whether we have used the right paper or not. If the deepest tones are only gray when

the highlights are barely veiled, the paper we have used is too soft; its scale is too long for that negative and we must make another print on a harder grade. On the other hand, if too much of the dark part of the print is black and the detail in the shadows is lost, the paper was too hard and we must try again with a softer grade. Be sure to carry the development to the full time called for by the maker of the paper—a print snatched from the developer to keep it from becoming too dark will never be pleasing. The dark areas will be muddy and it will lack brilliance and strength. If we have hurried the development, or have used the wrong paper, our print will lack what is known as "print quality".

No one has yet defined print quality satisfactorily, but we recognize it at a glance. No print is really good without it, and when we see one that stands out from the rest because of its depth and brilliance, we know that the various steps of the photographic process have all been carried out very nearly correctly. The exposure and development of the negative were right; the print was correctly exposed and fully developed; and most important of all, the right grade of paper was used.

Experience will soon let us judge the grade of paper to use. A glance at the negative will be enough, but the worker who tries several grades with that negative that seems to hold promise of an exceptional picture will soon be the one with the enviable reputation.

This and That

A most useful addition to the Nature photographers' equipment is the Utility Bag first introduced by Willoughbys, 110 West 22nd Street, New York. Strongly made of canvas and leather bound, the bag looks well and yet is big enough to hold all the paraphernalia we need. There are pockets for the bulkier objects like the camera, extra film, lenses and so forth, and zipper-closed compartments for meter, filters and the fragile accessories. The Utility Bag sells for \$6.50 complete with the carrying strap. Willoughbys also has a full catalog of equipment and supplies that may be had for the asking. Please remember to mention NATURE MAGAZINE.

The Eastman Company has recently announced three new films for the 35 mm. and 16 mm. cameras. They are extremely fine-grained and are faster than the older films. Panatomic X is especially recommended for the maker of large pictures. The speed ratings of the new films are as follows in daylight:

Panatomic X	25	Scheiner	40	Weston
Plus X	27	"	64	"
Super XX	29	"	125	"

For more detailed information may be obtained from the Eastman Kodak Company, Rochester, New York.

The photographer who really wants to make the best possible pictures needs a good working knowledge of filters. What they can do for us and how we may get the best results with them are told simply and without

too much venturing into the technical in the book *How to Use Filters* by Karl A. Barleben, Jr., F.R.P.S. It is published by H and K Publications of 434 Main Street, Stamford, Conn., and is probably on sale at your dealer's book counter. It is priced at seventy-five cents.

To those users of miniature cameras who are troubled with grain we would suggest the investigation of Panthermic 777, the new developer that may be used through a wide range of temperatures. It comes from the laboratories of the Defender Photo Supply Company of Rochester, New York, who will furnish full information on request. Please mention NATURE MAGAZINE.

A new holder for small cameras has just appeared. Shaped like a revolver grip, the Trigger Tripod, as it is called, makes the aiming and support of the camera easier and faster. It is a product of Photo Utilities, Inc., of 10 West 33rd Street, New York City, and is priced at \$1.50. Don't forget to mention NATURE MAGAZINE when writing to the maker for his circular.

Squirrel Food

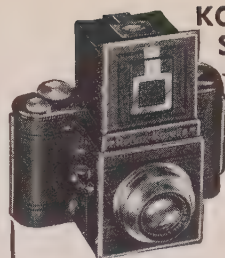
by Mrs. Chase D. Shedd

Last June I saw something that may or may not be unusual, but which I had never seen before. The suburb in which I live is a paradise for birds and gray squirrels. That morning there was a squirrel reconnoitering in our yard. Evidently deciding that his search was doomed to disappointment he climbed up and over the fence separating our yard from the next. Once in that yard he pulled up a toadstool, or mushroom, and climbed up to a small board nailed on one of the trees. There he perched himself on his haunches, holding the mushroom between his front paws. With his teeth he began peeling it and spitting out the peelings. When he came to the edible part he began eating industriously. He must have come to some that did not quite suit his taste for he spit out some that seemed to come from around the edge of the cap.

That same evening my husband and I came home from a drive. As we drove in the driveway a pair of eyes shone at the end of it. We thought nothing of it, supposing them to belong to a cat. Suddenly the animal turned to leave the yard and imagine our surprise when we discovered it to be a large coon. Whether it was a pet that had escaped or a wild one we don't know. About three blocks from our house is a bird refuge and we think he may have come from there.

A Bighorn Story

The Golden Ram is the story of a bighorn of the Rocky Mountains. It is the work of Lee Willenborg, author and artist, who functions in both capacities in this book. The story is told from the animal's point of view, but it also brings in a hunter who had been commissioned by a collector to bring in this ram. It is published by David McKay Company, Philadelphia, at two dollars.



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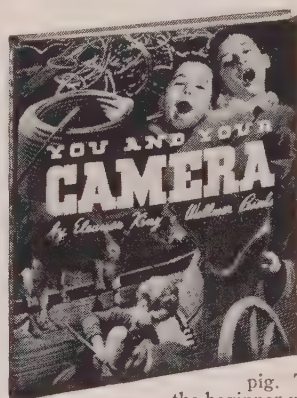
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Rainier Park Forests

The September-December issue of Nature notes prepared by C. Frank Brockman, Park Naturalist of Mount Rainier National Park, is devoted to the forests of the Park. The forests generally are discussed, together with a check list of the trees native to Mount Rainier and a field key to these trees.

Hummingbirds in the North

R. M. Sherk, who lives in Glendon, Alberta, Canada, about 130 miles northeast of Edmonton, is the happy host to many ruby-throated hummingbirds. Furthermore, he writes, while many people regard these birds as a great rarity in that part of Canada, his own experience has been different. A liberal planting of scarlet runners or other gaudy and sweet-scented flowers appears to be the simple answer. Ruby-throats were the only species in evidence, and they seemed to have departed for the south about August 20.

Bird Records

Over a period of six years a comparative bird record has been kept at the Packard Nature Camp, Cape Rosier, Maine. Winthrop Packard writes that there has been a continuous falling off in the numbers of herring gulls. Black-backed gulls have increased slightly, and cormorants seem to have increased, as they have become established on new island rookeries. Arctic and common terns hold their own. Twenty-one species of warblers have been recorded, which Mr. Packard feels is a very good list.

Varied Birds

Under the pretentious title of "Birds of the World", workers of the Federal Writers' Project have prepared a book that treats of a few more than one hundred species, each representing an order or other large group. In general the material is authentic and well-selected and the illustrations are good, and dated from life. A few exceptions are from mounted birds, and these are far less pleasing, and in a few cases, wrongly identified. Thus the illustration labelled yellow warbler is, in truth, some other warbler so badly mounted that we hesitate to name it. However, in spite of its shortcomings, we believe that the volume is well worth its price, \$1.75, to those who desire only a bird's eye view of the tribe of feathered bipeds. It is one of the Junior Press Books, put out by Albert Whitman and Company of Chicago.

E. A. P.

Scales and Fins

We may be wrong but we believe that *Scales and Fins* is the first school text devoted exclusively to presenting the story of fish and fishing in a lively, authentic and interesting fashion. It is the joint work of F. E. Engleman, Julia Salmon and Wilma McKeny, with illustrations supplied by Heman Fay, Jr., and H. Boylston Dummer. The authors have worked out a dialog-narrative form of treatment that adds dramatic value and movement to the text, making it a pleasure to study such a textbook. The publishers are D. C. Heath and Company and the book is listed at 96 cents.

LOOKING FORWARD

Beauty May Be Dangerous

In the wide realm of Nature, beauty and tragedy often go hand in hand. In a fascinating article, next month, Archibald Rutledge explores a fascinating field of the outdoors and shows us the danger of beauty in the wild, even as was beauty dangerous with Cleopatra and Helen of Troy.

"In Them Thar Hills"

There is gold, as the saying goes, and Nature put it there. Alfred E. Gaumer, engineer, geologist and miner, tells us the fascinating story of raw gold; its effect upon humans as he has observed it in the gold fields; its manner of occurrence; its place in the geological picture.

Like a Breeze in the Night

Just as silent is the kit fox, sly, wary and elusive animal of the West. L. M. Huey, naturalist and photographer at the San Diego Zoo, tells the story of this fox and of his successful shooting of it with a camera at night.

To the Island Paradise

Hawaii, of course, and NATURE MAGAZINE takes you there next month through an article about the noddy tern and a pictorial feature about the beautiful new aviary in Honolulu.

Not to Mention

Another educational insert like that in the October issue but devoted to weeds that stand above the winter's snow. Also other articles and the regular astronomy, microscope, photograph and dog departments.

A SUGGESTION—At Christmas time, or any other time, the gift of a **Subscribing Membership in the American Nature Association** is a welcome gift to any friend who loves the outdoors.

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Indoors and Out

By HOWARD ZAHNISER

“THE SPIRIT of desolation sits upon the hills; and in her baleful presence the northern blasts assemble on the plains, and the wintry frosts gather together in the once smiling valleys.” Thus Wilson Flagg describes November in *A Year with the Birds*. “The low moaning of autumn winds,” he says in *Halcyon Days*, “seem like dirges over the departed beauties of summer.” Elsewhere in the same volume he dwells more hopefully on the “blue-fringed gentian” that “may often be found in the meadows after the November frosts have seared the verdure of the fields, and changed the variegated hues of the forest into one monotonous tinge of brown and purple”—and the witch-hazel that “still retains its yellow blossoms, in defiance of the later frosts.” But in *A Year with the Trees* he takes some pleasure in this month; discusses that pleasant season known as Indian summer; and points out that “when November arrives, leading along with it the short days and the darkness of winter, it opens the windows of the deep woods.”

Such quotations are samples of possible browsings in the works of Wilson Flagg, who was born on November 5, 1805, and lived until May 6, 1884—a New Englander who studied medicine but never practiced, who served a time as insurance agent and as customs-house clerk, but who spent the best part (if not the most) of his life as a writer. It is recorded that he wrote some political articles for the magazines, a satire in the manner of Pope published in 1844 with the all-sufficient title *The Tailor's Shop: or Crown of Thorns and Coats of Thistles. Designed to Tickle Some and Nettle Others; Intended Chiefly for Politicians. Inscribed to Those Whom They May Fit*; and *A Prize Essay on Agricultural Education* published in 1858—none of which I have seen. His earliest book, published in 1834 with the title *Analysis of Female Beauty*, deals with twenty-five feminine qualities as exemplified by as many individuals who are described in around twenty couplets of verse each plus two pages of prose—a work that perhaps justifies the indulgence of a few quaint and fanciful moments. Flagg's only other book not concerned with Nature was *Mount Auburn: Its Scenes, Its Beauties, and Its Lessons*, published in 1861. Mount Auburn is a cemetery. John D. Wade, writer of the excellent sketch in the *American Dictionary of Biography*, describes this book as “lugubrious”, and rightly so, I think. Flagg edited the volume and made many contributions to it, including some verse, but his nicest touch was in dedicating the volume “To Jacob Bigelow, M. D., to whom the public is indebted for the first idea of rural burial for those who die in the city.” There is more comfort in Dr. Bigelow's idea than in all the book's messages of comfort. Certainly it deserves credit from those who reluctantly live in the city, for it affords some hope!

It is probably enough to know that these books have

existed and to leave their perusal to those dutiful servants who write articles and biographical sketches. But the books that Wilson Flagg wrote about the outdoors are of continuing interest. They may still be discovered now and then on the shelves of second-hand bookstores—in three volumes published in 1881 with the titles, *Halcyon Days*, *A Year with the Birds*, and *A Year with the Trees*; or in two volumes *The Woods and By-ways of New England*, published in 1872, and *The Birds and Seasons of New England*, in 1875. There was an earlier volume, which I have never seen, published in 1857 with the title, *Studies in the Field and Forest*.

The bibliography of Flagg's outdoor writings is essentially, however, the history of one work. W. G. Barton, in an essay read to the Essex Institute the year after Flagg's death, says that the author added a great deal of material to *Studies in the Field and Forest*, the 1857 volume, and that the whole was newly published in *The Woods and By-ways of New England*, 1872, and *The Birds and Seasons of New England*, 1875, both rather bulky volumes. So, three volumes were made of these two in 1881 and the work republished with the titles, *Halcyon Days*, *A Year with the Birds*, and *A Year with the Trees*.

The latest form of Flagg's writings omitted the illustrations of the two volumes, but apparently no text was omitted with the exception of a note “To the Reader” in *Woods and By-ways*, in which Flagg declares that his object was to inspire his readers “with a love of Nature and simplicity of life, confident that the great fallacy of the present age is that of mistaking the increase of the national wealth for the advancement of civilization,” and in which he also refers to an unpublished (and apparently never published) work to be entitled “The Progress and Perils of Civilization in America,” a subject that undoubtedly needs an author.

There is much of value today in Flagg's writings in addition to his descriptions of seasons, trees, birds, and flowers—descriptions based almost entirely on first-hand observations, Flagg having once written that he had “probably spent more time in the woods than any man who is not a woodcutter by trade.” *Halcyon Days* includes many analytical, philosophical or psychological, discussions of such qualities as grandeur, sublimity, beauty, homeliness, and the picturesque. *A Year with the Birds* makes strong pleas for protection and bases them on food habits, the criterion that was to be so well applied by the U. S. Biological Survey, established the year after Flagg's death. *A Year with the Trees* has a message that is still being carried to the American public through all the publicizing means that conservationists can find available. “Man has the power, which if exercised without regard to the laws of Nature, may, at no very distant period, render this earth uninhabitable by (Continued on page 559)



"... REACHING THERE, HE STOOD STRAIGHT UP ...
LOOKING ABOUT, 'READIN' HIS BOOK', AS THE
NEGROES SAY OF A DELIBERATING WILD THING"